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FLORA
OF THE
ROCKY MOUNTAINS
AND
ADJACENT PLAINS

COLORADO, UTAH, WYOMING, IDAHO,
MONTANA, SASKATCHEWAN,
ALBERTA,
AND NEIGHBORING PARTS OF
NEBRASKA, SOUTH DAKOTA, NORTH
DAKOTA, AND BRITISH COLUMBIA

BY
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PREFACE

After more than twenty-five years of study of the flora of the Rocky Mountain region, and seventeen years after the first description was drawn for the book, this manual is now presented to the public. Its history, purpose and scope are given in the introduction, with certain necessary explanations regarding the general features of the book.

Thanks are due to the custodians of many herbaria for the privilege of studying collections and types, and for the loan of specimens; these herbaria are enumerated in my introduction. The author wishes to thank all his associates at the New York Botanical Garden, especially Dr. N. L. Britton, Director-in-Chief, for encouragement and help in his work; Dr. J. K. Small, for help in critical cases and in certain groups, as for instance POLYGONACEAE and SAXIFRAGACEAE, and in the original draft of the key to the families; and Dr. J. H. Barnhart, for help in questions of nomenclature and literature. In drawing the generic descriptions, the author has frequently consulted Dr. Small's *FLORA OF THE SOUTHEASTERN UNITED STATES*. Dr. Barnhart has contributed also the list of authors, including their full names and years of births and deaths wherever it has been possible.

Thanks are also due to Mr. K. K. Mackenzie, who contributed the manuscript of *Carex*; to Professor E. Brainerd, who prepared that of *Viola*; and to Mr. W. W. Eggleston, who revised that of *Crataegus*.

As most manuals of phanerogamic botany also contain the ferns and their allies, an account of the fern-worts by Miss Margaret Slosson has been appended. The families ISOETACEAE, EQUISETACEAE and SELAGINELLACEAE were left by her until the last. She did some preliminary work on *Selaginella*, but before the work was finished she left the New York Botanical Garden temporarily, and the completion of the fernworts fell upon the author, who feels that the treatment of the three families is not adequate, as the manuscript was prepared hurriedly while the book was going through the press.

The author is indebted especially to the following botanists, who have kindly corrected the statements of the ranges of all of the species and furnished additions to the list of species known to occur in their respective states and provinces: Mr. J. M. Macoun, western Canadian provinces; Professor J. E. Kirkwood, Montana, Mr. J. Francis Macbride, Idaho; Professor A. O. Garrett, Utah; and Mr. George E. Osterhout, Colorado. Thanks are also due to the following persons who have gratuitously helped in reading the proofs: Professor A. O. Garrett, Mr. G. E. Osterhout, Miss K. D. Kimball, and Mr. A. E. Urban, now manager of The Hershey Press, who kindly continued proofreading even after he left his old concern. The help of Mr. Urban, who is an amateur botanist as well, has been especially valuable.

P. A. RYDBERG.

The New York Botanical Garden, November, 1917.

NOMENCLATURE AND LIMITATION OF GENERA AND SPECIES

The nomenclature used agrees, as far as possible, with the so-called American Code, used at the United States National Herbarium and Department of Agriculture, the New York Botanical Garden, and many of the universities and botanical institutions of this country. It differs from the International Code, followed by many institutions, principally in the following two features: it allows few exceptions from the rule that the oldest generic and specific name (after Linnaeus' *Species Plantarum* of 1753) should be used, and provides that, if a Latin name has been used for one plant, it can never be used for another. The nomenclature used in this manual differs somewhat on this account from that used by other writers on the flora of the region or a part thereof. Another important difference is due to the fact that the author believes that in many cases unnatural groups of species of diverse habit and structure should not be retained as genera just because our predecessors have regarded them as such. In other words, a genus should be divided into several, if it can be split up into smaller and more natural ones. Such divided genera are, for instance, the old large genera *Astragalus*, *Oenothera*, and *Aster*. On the other hand, the fully as large genera *Carex*, *Eriogonum*, and *Senecio* have been kept intact, as no natural division could be found.

For those who disagree with the author in the matters of nomenclature and limitation of genera and species, there will be very little difficulty in finding the scientific name to which they are accustomed, as synonyms have been freely cited, in fact as far as deemed necessary. The synonymy, of course, is by no means complete; only such is included as has been in use for the plant recently, or is necessary for the explanation of the accepted name, or represents supposed new species, which the author regards as indistinguishable from the one described. In the cases where a synonym is preceded by a "(?)" this means that the author has not seen the type of the synonym, but from the description supposes that it represents the same species as the one accepted.

A few of my friends have suggested that the place of publication of each name should also be given; while this would have increased the utility of the book, it would have added perhaps 150 pages. This manual will be useful to three classes: the amateur botanists, the students in high schools and colleges, and the professional botanists. The first two classes, as a rule, do not care for the full citation, and most of the professional botanists have access to the "Kew Index" and the "Card Catalogue," or other reference books. The omission of the place of publication will work hardships, therefore, to only a few.

PRONUNCIATION AND ACCENTUATION

In most of the schools of this country the so-called Roman pronunciation is used in reading Latin, but exceedingly few botanists pronounce the Latin names in accordance with it. They are supposed to pronounce it according to the so-called English method, but the author has not found two persons who do it alike. He frankly admits that he does not know how to pronounce the names according to the latter method. According to the Roman method, as he was taught it, the vowels are pronounced nearly as follows:

a	long as in father	short as in hat
e	" " " there	" " " met
i	" " " machine	" " " it
o	" " " no	" " " not
u	" " " rule	" " " put

The consonants he learned to pronounce as they are in English, except that *c* and *g* are hard as in *cat* or *go*, even before *e*, *i*, and *y*; *j* as consonant *y*, *z* as *ts*, and *ch* and *ph* in Greek words as *k* and *f*.

Most of the mispronunciations, whether the English, Continental, or Roman pronunciation is used, are due to ignorance of the accent. On the proper accentuation the author wishes to say more,* as the specific names in this volume

* The explanations given in this discussion may not agree with most Latin grammars in English, but the author thinks that this is because the English grammarians consciously or unconsciously interpret constructions in Latin according to the models of the highly individualized English language.

do not have the accent indicated. Clements gives the following rule for accents: "In words of two syllables or more the accent is on the penult [next to the last syllable], when it is long; when the penult is short, the antepenult [third syllable from the end] is accented." This is correct if rightly understood. Long syllables are of two kinds, however; one with *vowel* length, the other with *consonant* length, that is, when it ends in one or more consonant sounds. Unfortunately, in a syllable with consonant length the vowel is usually called short, not only in English, but in most modern languages. In many Latin lexicons the vowel in such a syllable is marked as long (wrong according to modern notions), in a few as short; others are noncommittal. In fact, the syllable is long (as shown in verse) although the vowel is short. There are three kinds of syllables, two ending in vowels, and one in a consonant. If there are one or more consonants between two vowels, one of these is always counted to the second syllable and the rest to the first, except that *ch*, *ph*, and *th* are regarded as one letter and a mute followed by *r* is carried to the second syllable (*hy-dra*, *as-tra*).

The grave accent (à) is here used to denote a long vowel* and the acute (á) a short vowel syllable or a syllable with consonant length. The penult has the accent when it ends in a consonant, but if it ends in a vowel it has the accent only if this vowel is long. In *hy-dro-phyll-lum* (water-leaf) the penult ends in a consonant and hence has the accent, and the vowel is marked short, as the syllable has consonant length; in *hy-dró-pha-la* (water-lover) the penult ends in a vowel and this is short; the accent is removed to the antepenult and, as the connecting vowels *i* (in Latin) or *o* (in Greek) in compound words are short, the antepenult has a short accent. Greek words follow practically the same rules, but unfortunately they do not always have the same quantity as the corresponding Latin words. For instance, in Latin the *y* in *stylus* (in classical Latin better *stilus*) is short, while in *στυλος* the *υ* is long. In *brevistylis* (Latin) the accent is on the antepenult, while in *brachystylis* (Greek) it is on the penult. A person must not be influenced by the English pronunciation of words similar to or derived from the Latin or Greek scientific terms, as it is very often corrupted. The words *Spermatóphyta*, *Pteridóphyta*, etc., have the accent on the antepenult and short *o* and *y*, while the English *Spermátophyte* and *Pteridóphyte* have the accent on the antepenult with a long *y* in the last syllable. Just the reverse we find in the Greek and Latin *Anemónē* and the English *Anémone*.

As stated before, when the penult ends in a consonant, *i. e.*, when the vowel is followed by two consonants or more, or a double consonant, it always has the accent and this is short. If, however, the vowel is followed by one or no consonant, one has to find out whether it is long or short. To determine this one has very often to go to the lexicon. Most of the specific names are Latin or Greek adjective, some are nouns in the genitive case, and a few are old generic names or nouns of barbaric origin. For the last two categories no rules can be given, but the following hints may help in pronouncing the adjectives and genitives:

The penult is long, as a rule, in the following adjective endings and hence takes the long accent: *-ālis*, † *-ānus*, *-āris*, *-ātus*, *-ēnus*, *-ētus*, *-ānus*, † *-ātus*, *-ārus*, *-oides*, *-ōvus*, *-ōsus*, *-ūnus*, *-ūnes*, *-ūrus*, *-ūsus*, *-ūtus*. In classical Latin there were very few compound adjectives, but in botanical Latin they are used freely. A few in which the last term has a long vowel in the penult and hence accented, may be mentioned: *-fūsus*, *-glūmus*, *-phūsus*, *-flōrus*.

The penult has usually a short vowel in the following adjective endings, and hence the accent is removed to the antepenult: *-acus*, *-eus*, *-eris*, *-erus*, *-eger*

* This must not be confused with the so-called long English *a*, for in English nearly all the sounds of *a* (except the short *a* as in "hat") are long. The *a* in "hall" is long in English, though not the so-called long sound. In Latin, a word with such a spelling would have consonant length and be denoted with the short accent. In English the *a* in the names Hall and Haller are pronounced differently, as it is in *mail* and *mallet*, but in Latin the *a* is pronounced the same in *Hálliti* and *Hállerti*.

† Only the masculine form is given here, the feminine and neuter forms follow the same rule; *-ālis* and *-ānus* stand for *-ālis*, *-ālis*, *-āle*, and *-ānus*, *-āna*, *-ānum*, etc.

‡ Short in *serotinus*, *gossypinus*, *cannabinus*, and others. On the other hand *salicinus* and *cyperinus* are usually indicated as long. The classical form of these words were, however, *salīgīnus* and *cyprīnus*.

(-egra, -egrum), -icus, -ichus, -idis, -idus, -ilis, -ilus, -imus, -ior, -ius, -uus, -yus. The compound words ending in the following syllables have also a short vowel in the penult: -cladus, -cola, -color, -fera, -ferum, -gera, -gerum, -gynus, -fidus, -filus, -philus, -lepis, -olens, -pilis, -podus, -stomus, -tomus, -virens, -phytum. If the short connecting vowels *i* (in Latin) and *o* (in Greek) appear in the penult, they are not accented; when they appear in the antepenult in words with short penult they receive the short accent: *ármiger*, *ármigera*, *spínifer*, *spínifera*. Of course, in adjective endings in which the penult has consonant length, this is accented and the vowel is short: -énsis, -éllus, -íllus, -fórmis, -éstus, -íster, -éster, -éssus. The same rule applies to compound words ending in -cárpus, -róstris, -phýllus.

By following the hints given above, any one can accent correctly eighty per cent. of the specific names in this flora. A few words may be said concerning the genitives of personal names and the same remarks apply to generic names dedicated to persons. The usual method of Latinizing a personal name is to add *ius* (genitive *-ii*) or, in case of a generic name dedicated to a person, *-ia*, to it if it ends in a consonant (except *r*), and *-us* (*-i*) and *-a* if the name ends in a vowel or *r*. If the noun ends in *-er*, as *Palmer*, it is better to regard this as the proper Latin form with *Palmer-i* in the genitive. As the *i* in the penult of *-ii* and *-ia* always is short, the accent in such words will always be on the antepenult. Harder to determine is the place of accent if the genitive ends in a single *-i* or the generic name in merely *-a*, as it depends upon whether the penult is long or short. Many botanists pronounce the names derived from persons as they would the family name itself, with the Latin ending added, as *Jámes-i-a* and *Jámes-i-i*, named for James; while the Latin usage would require *Ja-mè-si-a* and *Ja-mè-si-i*. In Latin all syllables are pronounced and the accent can never be further from the end than in the antepenult. It has been a custom to regard the vowel in the antepenult of the endings *-esu*, *-onu*, *-inu*, *-unu*, *-eli*, etc., and in the penult of *-onis*, *-oni* as long. Many include the ending *-eri*. This would be perhaps defensible in the case of *Berlandièri*, *Plumèri*, where the ending *er* has the accent in French and in plant names dedicated to some German and Scandinavian persons who write their name with an accent on the last syllable, but the author does not think it correct in *Pálmeri*, *Bòreri*, *Brèweri*, *Wárneri*, where the English name has a short *er* and the words in *er* following the second declension in Latin as a rule had short *e* in the genitive or dropped it altogether. The author thinks that the four names just mentioned should have the accent on the first syllable.

The generic names are much harder to treat. They are old Latin or Greek nouns, or vernacular names, with or without Latin endings, or modified personal names, or compound words (mostly Greek) manufactured according to the whims of the authors. The author saw no other way but to indicate their proper accent in each case as far as they could be ascertained.

NAMES OF AUTHORS

The generic and specific names are followed by the names of their authors, usually abbreviated; the abbreviations are explained on pages 1070-8. If an author's name is placed in parenthesis after a generic name, it means that he published it before 1753 and that it was accepted after that date by the author following the parenthesis (usually Linnæus). After the specific name, an author's name in parenthesis signifies that he originally proposed it, either in another genus or else only as a subspecies, variety, or form, and the author following the parenthesis was the first one to make the accepted combination.

COMMON NAMES

The common names are given in most cases after the Latin generic name. A common name has been inserted after the description of a species only where it seems to apply exclusively or principally to that species. In the Rocky Mountain region the common names apply usually to all species of the genus rather than to a particular one. No attempt has been made to manufacture a "common name" where there is none in existence.

INTRODUCTION

MEASUREMENTS

The measurements have been given in metric system, now used by most of the scientific bureaus of the United States and universities and colleges of the country. In the old English system, formerly used in descriptive botany, the inch was divided into twelve lines. A ruler with this division is hard to find now-a-days, while metric rulers can be had nearly everywhere. For those who are more accustomed to the English measurements a table is given on page xii, with equivalents near enough for all practical purposes.

HABITAT AND DISTRIBUTION

Near the end of each specific description is given the usual habitat of the plant and its geographic distribution. In order to save space the latter is given in abbreviation. Usually four states or provinces, or less, are mentioned; if the distribution is irregular, sometimes more than four. The expression: Man—Kans.—Utah—Alta. would mean that the area in which the plant grows naturally extends from Manitoba to Kansas, Utah, and Alberta. If a state or province is placed within parenthesis with a question mark preceding, as for instance (? Colo.), it means that the plant has been reported from said state, but that the author has not verified the assertion and doubts its correctness. Isolated or exotic distribution is set off from the general endemic one by a semicolon; and immigrants are distinguished as adventive (adv.), i. e., not fully established, or fully naturalized (nat.), or escaped from cultivation. The abbreviations used are included in the table on page xii.

ALTITUDES AND LIFE ZONES

In the original draft, altitudinal distribution was stated. In an area which extends in latitude 18 degrees, or approximately 1250 miles, however, a statement of the altitudes does not mean very much, as a plant which has its best development in Colorado at 3000 meters (10,000 feet) does not reach half that altitude in the Canadian Rockies. Instead of the altitude in meters or feet, the zonal distribution is therefore given. The following life zones have been accepted in this work:

Alpine Zone (*Alp.*), the region above timberline
 Subalpine Zone (*Subalp.*), or Spruce Belt.
 Montane Zone (*Mont.*), or Pine Belt.
 Submontane Zone (*Submont.*), or Foothills, or in the south the Chaparral Belt.
 Sonoran, or rather Upper Sonoran, Zone (*Son.*), or Piñon-Cedar Belt and the Upper Desert.

Lower Sonoran Zone (*L. Son.*) or Lower Desert, limited with the manual area to the Colorado River Cañon and Virgin River Valley in Utah

As the first four of these zonal names apply only to a mountain region, they could not be used for the part of the area occupied by the plains, especially east thereof. The same life zone that occupies the high mountains in temperate latitudes will occupy the lowlands nearer the poles, and these zones there become *Arctic*, *Subarctic*, *Boreal*, and *Subboreal*. The Montane and Subalpine Zone reach the lowlands or plains in Alberta and hence also meet the western extension of the Boreal and Subarctic Zones of the east. This merging takes place, however, mostly north of latitude 55°, as the grass-covered plains push across the northern branch of Saskatchewan River; it is practically only along the lower part of said river that the Boreal and Subarctic flora enters the area of this work. The hardwood forests of the subboreal zone does not reach the Rockies; only a small element represents it in the foothills of the Black Hills, South Dakota, and exceedingly few of its plants reach eastern Saskatchewan. The zone is represented on the plains by grasslands and as these are so different from both the foothills of the Rockies and the eastern subboreal hardwood forest, it has seemed better to designate them with a different name, and the word *Plain* represents the grass-covered portion of the Subboreal Zone. The plains south of the divide between the Arkansas and Platte rivers belong in reality to the Sonoran Zone, but as the transition is so gradual and the general characters of the two divisions

are much alike, in many cases the word *Plain* also includes the Sonoran portion of the plains, the so-called *Staked Plains*. Tables showing the approximate altitudes occupied by the different zones in southern Colorado and southern Montana, and in Alberta at the crossing of the Canadian Pacific Railroad, and also the approximate latitudes at which they meet the plains, lowlands, or level basins are shown below.

The western side of the mountains is warmer than the eastern. It is also dryer, except in the northern part, where the moisture conditions are reversed. The lower zones, therefore, extend further north on the west side.

	Colorado	Montana	Alberta
Alpine (<i>Atp.</i>)	3500-4300 m.	2700-3500 m.	2100-3500 m.
Subalpine (<i>Subalp</i>) . .	3000-3500 m.	2500-2700 m.	1800-2100 m.
Montane (<i>Mont</i>) . . .	2500-3000 m.	1800-2500 m.	1200-1800 m.
Submontane (<i>Submont</i>) . .	1800-2500 m.	1500-1800 m.	<i>Plain</i>
Upper Sonoran (<i>Son</i>) . . .	1350-1800 m.	<i>Plain</i>	

This table may be given also in the English measures:

Alpine	11,500-14,400 ft.	9,000-12,000 ft.	7,000-12,000 ft.
Subalpine.	10,000-11,500 ft.	8,000- 9,000 ft.	6,000- 7,000 ft.
Montane	8,000-10,000 ft.	6,000- 8,000 ft.	4,000- 6,000 ft.
Submontane	6,000- 8,000 ft.	5,000- 6,000 ft.	<i>Plain</i>
Upper Sonoran . .	4,500- 6,000 ft.	<i>Plain</i>	

The different zones meet the lowlands, plains or level basins at approximately the following latitudes:

	East side	West side
Alpine-arctic . .	69°-90°	69°-90°
Subalpine	55°-69°	55°-69°
Montane	48°-55°	50°-55°
Submontane	38° 30'-48°	42°-50°
Upper Sonoran	35°-38° 30'	35°-42°

TIME OF FLOWERING

At the end of the specific description is given the month of flowering. The symbols used are: Ja, F, Mr, Ap, My, Je, Jl, Au, S, O, N, D.

TABLES

ABBREVIATIONS

The well known abbreviations of the states of the United States are here omitted.

Adv. = adventive	mm = millimeter
Alp. = Alpine Zone	Mont. = Montane Zone
Alta. = Alberta*	Mont. = Montana
Am. = America or American	Mr = March
Ap = April	My = May
Arctic = Arctic Zone	n = northern
Au = August	N = November
Auth. = Authors†	N. Am. = North America
B. C. = British Columbia	Nat. = Naturalized
Boreal = Boreal Zone	N. B. = New Brunswick
c = central	ne = northeastern
C. Am. = Central America	Newf. = Newfoundland
cm. = centimeter	N. S. = Nova Scotia
D = December	nw = northwestern
dm. = decimeter	O = October
e = eastern	Ont. = Ontario
Eu. = Europe	P. E. I. = Prince Edward's Island
Eurasia = Europe and northern Asia	Plain = Subboreal Plains
F = February	Que. = Quebec
(Fl. Colo.) = The Author's Flora of Colorado	s = southern
(Fl. Mont.) = Catalogue of the Flora of Montana and Yellowstone Park	S = September
Greenl. = Greenland	S. Am = South America
Ja = January	Sask. = Saskatchewan
Je = June	se = southeastern
Jl = July	Son. = Sonoran Zone
Labr. = Labrador	Subalp. = Subalpine Zone
L. Calif. = Lower California	Subarctic = Subarctic Zone
L. Son. = Lower Sonoran Zone	Subboreal = Subboreal Zone
m. = meter	Submont. = Submontane Zone
Mack. = Mackenzie Territory	sw = southwestern
Man. = Manitoba	Trop = tropical
Mex. = Mexico‡	w = western
	W. Ind. = West Indies

SIGNS

- (short dash) between figures or words means that the two figures or two words denote the extreme of variation.
- (long dash) between the names of two or more states denotes the extent of distribution.
- § Subgenus or section of a genus.
- × denotes a hybrid between the two species mentioned.

MEASUREMENTS

1 mm. = $\frac{1}{25}$ inch	1 line = 2 mm.
3 mm. = $\frac{1}{8}$ inch	$\frac{1}{4}$ inch = 3 mm
1 cm. = $\frac{25}{100}$ inches	1 inch = 25 mm.
5 cm. = 2 inches	1 span = 1 dm.
1 dm. = 4 inches	1 foot = 3 dm.
1 m = 40 inches or $3\frac{1}{4}$ feet	1 yard = 9 dm.
300 m. = 1000 feet	

* Many people use the abbreviation "Alb", but as far as the author has been able to ascertain, the official one is "Alta."

† Used in cases of misapplications of names where the author first using it in such a sense has not been ascertained.

‡ Observe the difference between N. M. (New Mexico) and n. Mex. (northern Mexico).

SPERMATOPHYTA

SEED-BEARING OR FLOWERING PLANTS.

Plants with flowers containing stamens, or pistils, or both, and producing seeds containing an embryonic plant. Alternation of generations not apparent, the gametophyte being exceedingly reduced. The pollen-grains (*microspores*) contained in the anthersacs of the stamens, after liberation and reaching the stigma of the pistil or the naked ovules, germinate and produce a tube, by means of which the egg-cell (*macrospore*) of the ovules (*macrosporangium*) is fertilized.

	PAGE
Ovules and seeds borne on the surface of an open bract or scale; stigmas wanting.	
Class I. GYMNOSPERMAE	11
Ovules and seeds in a closed cavity (ovary), formed by one or more united modified leaves, with one or more stigmas at the end.	
Class II. ANGIOSPERMAE	20
Cotyledons usually single; earlier leaves alternate; leaves mostly parallel-veined; stem endogenous.	20
Subclass 1. MONOCOTYLEDONES	
Cotyledons mostly 2; earlier leaves opposite; leaves mostly netted-veined; stem exogenous.	185
Subclass 2. DICOTYLEDONES	

KEY TO THE FAMILIES.

Class 1. GYMNOSPERMAE. NAKED-SEEDED PLANTS.

Perianth none; trees or shrubs with needle- or scale-like leaves not sheathing.	
Pistillate flowers in aments; fruit a cone, either dry or berry-like.	
Carpellary scales subtended by bracts, never peltate; ovules inverted; buds scaly; wings of the seeds formed from a portion of the carpellary scales.	11
1. PINACEAE	
Carpellary scales not subtended by bracts, mostly peltate or fleshy; ovules erect; huds naked; wings of the seeds, if present, a part of the seed-coat.	17
2. JUNIPERACEAE	
Pistillate flowers single or in pairs, without carpellary scales; fruit drupaceous or haccate.	18
3. TAXACEAE	
Perianth present, urn-shaped; pistillate flowers single or in pairs; horsetail-like shrubs with jointed branches and the leaves reduced to sheathing scales.	19
4. EPHEDRACEAE	

Class 2. ANGIOSPERMAE SEED-VESSELED PLANTS.

Subclass 1. MONOCOTYLEDONES.

Small lens-shaped, ellipsoid, or flask-shaped floating aquatics without leaves.	
15. LEMNACEAE	143
Plants with true stems and leaves, the latter however, sometimes scale-like.	
Perianth rudimentary or degenerate, its members often bristles or mere scales, not corolla-like, or wanting.	
Flowers not in the axils of dry or chaffy bracts (glumes).	
Perianth of bristles or chaffy scales.	
Flowers in elongate terminal spikes; fruit hidden among bristles.	20
5. TYPHACEAE	
Flowers in globose lateral spikes; fruit not hidden among bristles.	20
6. SPARGANIACEAE	
Perianth fleshy or herbaceous, or wanting.	
Flowers in dense spikes subtended by an enlarged bract (spathe); fruit baccate; endosperm present; emerged water or bog plants.	
14. ARACEAE	143
Flowers, if spicate, not subtended by a spathe; fruit drupaceous; endosperm wanting; submerged water plants.	

- Calyx irregular, one of the sepals spurred or saccate; anthers united around the stigma. 69. BALSAMINACEAE 536
- Calyx regular; none of the sepals saccate; anthers distinct. Style basal, arising between the nearly distinct lobes of the ovary; leaves odd-pinnate. 70. LIMNANTHACEAE 537
- Styles not basal, leaves in ours abruptly pinnate, or digitate. 71. ZYGOPHYLLACEAE 538
- ** Stamens inserted on the margin of a disk or hypanthium (perigynous or hypogynous).**
- Styles and upper part of the ovaries distinct. 57. SAXIFRAGACEAE 376
- Styles united. Stamens as many as the petals and opposite them. Fruit a samara. 78. ACERACEAE 551
- Fruit a berry, drupe, or capsule. Sepals manifest; petals involute, fruit capsular or drupaceous; ours shrubs or trees. 79. RHAMNACEAE 553
- Sepals minute or obsolete; petals valvate; fruit a berry; ours vines with tendrils. 80. VITACEAE 556
- Stamens as many as the petals and alternate with them, or more. Hypanthium flat or obsolete, disk fleshy. Styles united, arising in the center, between the nearly distinct lobes of the ovary; small hydrophytic plants. 70. LIMNANTHACEAE 537
- Styles not arising between the ovaries, trees or shrubs. Plants without secreting glands in the bark. Plants with resiniferous tissue, fruit drupaceous, seeds without aril, leaves in ours compound. 77. ANACARDIACEAE 550
- Plants without resiniferous tissue; fruit a loculicidal capsule; seed with a fleshy aril; leaves simple. 76. CELASTRACEAE 548
- Plants with secreting glands in the bark. 72. RUTACEAE 539
- Hypanthium cup-shaped or campanulate; disk obsolete or inconspicuous. 90. LYTHRACEAE 582
- b. Ovary at least partly inferior.**
- a. Stamens numerous.**
- Ovary partly inferior. Fruit a capsule. 58. HYDRANGEACEAE 392
- Fruit a pome. 61. MALACEAE 445
- Ovary wholly inferior. Sepals and petals 4 or 5, very unlike each other; leaves ample. Trees or shrubs; fruit fleshy. 61. MALACEAE 445
- Herbs with rigid hairs; fruit capsular. 87. LOASACEAE 569
- Sepals and petals nearly alike, at least the latter numerous, leaves typically and in all ours mere scales or wanting, succulent plants armed with spines. 88. CACTACEAE 575
- b. Stamens not more than twice as many as the petals.**
- Styles wanting, stigmas sessile. 92. HALORIGIDACEAE 605
- Styles present. Plants without tendrils. Styles distinct. Ovules several in each cavity of the ovary; fruit a capsule or a fleshy many-seeded berry. Fruit, if dehiscent, valvate. Leaves opposite; fruit a leathery capsule. 58. HYDRANGEACEAE 392
- Leaves alternate; fruit a berry. 59. GROSSULARIACEAE 394
- Fruit circumscissile. 42. PORTULACACEAE 262
- Ovules solitary in each cavity of the ovary; fruit a drupe or 2-5 more or less united achenes. Fruit drupaceous or baccate; gynoeclum 1-several carpellary, if 2-carpellary the stigmas introrse.

KEY TO THE FAMILIES

- Ovule with a ventral raphe; leaves mostly alternate, blades lobed or compound. 94. ARALIACEAE 633
- Ovule with a dorsal raphe; leaves mostly opposite; blades entire or merely toothed. 95. CORNACEAE 634
- Fruit dry, a cremocarp; gynoeceum 2-carpellary; stigmas terminal. 93. AMMIACEAE 606
- Styles united, or single
- Ovary enclosed in or surpassed by the hypanthium or adnate to it.
- Anthers opening by pores, fruit a berry. 99. VACCINIACEAE 643
- Anthers opening by slits; fruit a capsule
- Ovary with parietal placentae 87. LOASACEAE 569
- Ovary with central or basal placentae
- Hypanthium merely enclosing the ovary. 90. LYTHRACEAE 582
- Hypanthium adnate to the ovary. 91. ONAGRACEAE 583
- Ovary exceeding the hypanthium, the top free 58. HYDRANGIACEAE 392
- Plants with tendrils; fruit a pepo, leaf-blades palmately veined. 129. CUCURBITACEAE 821
- II. Petals more or less united.**
- A. Ovary superior.**
- 1. Stamens free from the corolla.**
- Gynoeceum of a single carpel; corolla papilionaceous 65. FABACEAE 454
- Gynoeceum of several united carpels.
- Filaments united
- Stamens diadelphous. 51. FUMARIACEAE 319
- Stamens monadelphous.
- Anther-sacs opening by slits; calyx and corolla regular. 67. OXALIDACEAE 533
- Anther-sacs opening by pores; calyx and corolla very irregular. 73. POLYGALACEAE 540
- Filaments distinct.
- Corolla regular; anthers distinct.
- Herbaceous saprophytes, without green leaves. 97. MONOTROPACEAE 638
- Herbs or shrubs with green leaves.
- Corolla of essentially distinct petals, 1 or 2, united only at the base, herbs with rootstocks. 96. PYROLACEAE 635
- Corolla of distinctly united petals; shrubs 98. ERICACEAE 639
- Corolla irregular, one of the petals free; anthers united. 69. BALSAMINACEAE 536
- 2. Stamens partially adnate to the corolla.**
- a. Stamens as many as the lobes of the corolla and opposite them, or twice as many or more; ovary 1-celled; placentae central or basal.** 100. PRIMULACEAE 646
- b. Stamens as many as the lobes of the corolla and alternate with them, or fewer.**
- * Corolla not scarious, veiny; fruit various, but not a pyxis.
- † Carpels distinct, except sometimes at the apex.
- Styles united; stamens distinct or gynandrous. 105. APOCYNACEAE 667
- Styles distinct; stamens monadelphous. 106. ASCLEPIADACEAE 669
- †† Carpels united.
- Ovary 1-celled, with central placentae.
- Corolla-lobes convolute or imbricated in the bud; leaves typically opposite and simple. 103. GENTIANACEAE 657
- Corolla-lobes induplicate-valvate in the bud; leaves alternate, in ours mostly basal and trifoliolate 104. MENTHANTHACEAE 667
- Ovary 2-3-celled, or falsely 4-celled, or if 1-celled with parietal placentae.
- Stamens 2, opposite to each other; corolla regular. 101. OLEACEAE 655
- Stamens usually more than 2, if only 2 not opposite to each other and the corolla irregular.
- Leaves with stipules or stipular lines. 102. LOGANIACEAE 657

KEY TO THE FAMILIES

9

Leaves without traces of stipules.

Stamens 5, if only 3-4, not didynamous.

Fruit a capsule or berry; ovary not 4-lobed.

Styles or stigmas usually distinct.

Parasitic twining plants, with scale-like leaves.

108. CUSCUTACEAE 677

Plants not parasitic; leaves normal.

Inflorescence not scorpioid; flowers cymose or solitary; ovary 2-3 celled.

Corolla plaited and the plaits convolute in the bud; flowers axillary, solitary or cymose-conglomerate; plants usually twining.

107. CONVULVACEAE 674

Corolla merely convolute in the bud, not plaited; flowers cymose; plants never twining.

109. POLEMONIACEAE 679

Inflorescence more or less distinctly scorpioid; ovary in ours 1-celled or imperfectly 2-celled.

Fruit a capsule.

110. HYDROPHYLLACEAE 699

Fruit more or less drupaceous.

111. EHRETIACEAE 710

Styles and stigmas wholly united.

Ovules few. 109. CONVULVACEAE 674

Ovules numerous.

Median axis of the gynoecium in the same plane as the axis of the stem; seeds mostly pitted.

116. SOLANACEAE 753

Median axis of the gynoecium not in the same plane as the axis of the stem; seed tuberculate. (*Verbascum* in)

117. SCROPHULARIACEAE 760

Fruit of 1-4 nutlets; ovary more or less distinctly 4-lobed.

Style or stigma furnished with a glandular ring.

112. HELIOTROPACEAE 711

Style or stigma not furnished with a glandular ring.

Fruit 4 dry nutlets.

113. BORAGINACEAE 712

Fruit more or less drupaceous.

111. EHRETIACEAE 710

Stamens 4 and didynamous, or 2 or 1.

Stamens 2 and opposite to each other; corolla regular.

101. OLEACEAE 655

Stamens, if 2, not opposite to each other, nor the corolla regular.

Carpels ripening into 2 or 4 nutlets, an achene, or a drupe.

Style apical on the lobeless ovary.

114. VERBENACEAE 739

Style arising between the 4 lobes of the ovary.

115. LAMIACEAE 741

Carpels ripening into a capsule.

Placentae of the ovary axile.

Ovary 2-celled, rarely 3-5-celled; land-plants.

117. SCROPHULARIACEAE 760

Ovary 1-celled; ours submerged water plants or bog plants.

118. LENTIBULARIACEAE 801

Placentae of the ovary parietal.

Herbs parasitic on the roots of other plants; leaves scale-like, not green.

119. OROBANCHACEAE 802

Herbs with green leaves, not parasitic.

120. MARTYNIACEAE 804

KEY TO THE FAMILIES

- ** Corolla scarious, veinless; fruit a pyxis.**
 121. PLANTAGINACEAE 804
- B. Ovary inferior.**
- Stamens with the filaments free from the corolla.
 - Stamens 10; anther-sacs opening by terminal pores or chinks. 99. VACCINIACEAE 643
 - Stamens 5 or fewer; anther-sacs opening by longitudinal slits. 130. CAMPANULACEAE 822
 - Corolla regular; anthers distinct. 131. LOBELIACEAE 824
 - Corolla irregular; anthers united.
 - Stamens adnate to the corolla.
 - Ovary with 2-many fertile cavities and 2-many ovules; calyx unmodified, at least not a pappus. 129. CUCURBITACEAE 821
 - Plants tendril-bearing.
 - Plants not tendril-bearing.
 - Ovules mostly on basal placentae; plants parasitic or saprophytic.
 - Leaves opposite; fruit a berry; tree-parasites. 125. LORANTHACEAE 816
 - Leaves alternate; fruit a drupe or nut; root-parasites or saprophytes. 126. SANTALACEAE 817
 - Ovules variously borne, but not on a basal placenta; plants not parasitic.
 - Stamens as many as the corolla-lobes.
 - Leaves with stipules (often leaf-like and usually regarded as leaves) adnate to the stem between the leaf-bases. 122. RUBIACEAE 806
 - Leaves without stipules or if present these adnate to the petioles. 123. CAPRIFOLIACEAE 810
 - Stamens twice as many as the corolla-lobes; low herbs with ternately dissected leaves. 124. ADOXACEAE 816
 - Ovary with one fertile cavity; calyx often modified into a pappus.
 - Flowers not in heads, often in head-like spikes or racemes. 127. VALERIANACEAE 818
 - Flowers in involucrate heads.
 - Flowers all with tubular corollas or none, or only the ray-flowers with ligulate corollas.
 - Stamens distinct.
 - Flowers hermaphrodite, surrounded by a cup-like involucre; anthers versatile. 132. DIPSACEAE 827
 - Flowers unisexual, not involucrate; anthers basifixed. 133. AMBROSIAEAE 827
 - Stamens united by the anthers, or if distinct (in *Kuhnia*) the flowers hermaphrodite and anthers basifixed. 134. CARDUACEAE 833
 - Flowers all with ligulate corollas. 135. CICHORIACEAE 1015

Class 1. **GYMNOSPERMAE.** NAKED-SEEDED PLANTS.

Ovules naked, inserted on the upper side of an open, mostly flat, more or less developed scale, not enclosed in an ovary. Pollen-grains divide into two or more cells, of which one produces a pollen-tube; this fertilizes the ovule directly. All trees or shrubs, most of them evergreen.

Family 1. **PINACEAE.** PINE FAMILY.

Resinous trees or shrubs, mostly with evergreen, needle-shaped or linear leaves. Stamens several together, subtended by a scale, forming elongated aments; filaments more or less united; anthers usually 2-celled; pollen-grains globose, ellipsoid, or lobed. Pistillate aments consisting of usually numerous spirally disposed scales subtended by bracts. Ovules inverted, usually 2 at the base of each scale. Fruit a dry cone. Seeds usually 2 at the base of each scale, often samara-like; wing formed by a part of the scale.

Leaves several together (in one species solitary), surrounded by a sheath at the base; cones maturing the second year.

Cone-scales with dorsal, usually spine-armed appendages.

Seeds with elongated wings attached to the seeds when they fall; leaves mostly with two fibro-vascular bundles. 1. *PINUS*.

Seeds with narrow or rudimentary wings, which remain attached to the scales when the seeds fall; leaves with a single fibro-vascular bundle. 2. *CARYOPITYS*.

Cone-scales with inconspicuous terminal unarmed appendages.

Seeds with rudimentary wings attached to the scales; cones subsessile, spreading. 3. *APINUS*.

Seeds with well-developed wings, which remain attached to the seeds; cones distinctly stalked, pendulous. 4. *STROBUS*.

Leaves not surrounded by sheaths; cones maturing the first year. 5. *LARIX*.

Leaves in fascicles at the ends of short branches, deciduous.

Leaves scattered along the branches, persistent.

Branches smooth, not roughened by persistent leaf-bases.

Cones erect, their scales and bracts deciduous from the persistent axis; leaves sessile with circular leaf-scars. 6. *ABIES*.

Cones pendulous, their scales and bracts persistent; leaves petioled with trans- 7. *PSEUDOTSUGA*.

Branches roughened by persistent leaf-bases (sterigmata).

Leaf-blades petioled with a single dorsal duct; anthers opening transversely; seeds with resin-vesicles. 8. *TSUGA*.

Leaves flat, with stomata only on the lower side, 2-ranked by twisting of the petioles; cones small, drooping. 9. *HESPEROPEUCE*.

Leaves not much flattened, keeled on the lower side, with stomata on both sides, spreading in all directions; cones elongated, erect at least at first. 10. *PICEA*.

Leaf-blades sessile, with two lateral ducts, in ours 4-angled and spreading in all directions; anthers opening longitudinally; seeds without resin-vesicles.

1. **PINUS** (Tourn.) L. HARD PINES, PITCH PINES.

Monoecious evergreen trees or rarely shrubs, with two kinds of leaves, the primary leaves chaff-like, deciduous, the secondary ones green, needle-shaped, usually with two fibro-vascular bundles (in all ours except in *P. aristata*), in fascicles of 2-5, surrounded by a sheath, which is usually persistent. Staminate aments elongated, at the ends of branches of the preceding year; anthers 2-celled, opening longitudinally; pollen-grains 3-celled, the two lateral cells empty. Pistillate aments globose or oblong, sessile or nearly so, below the terminal bud or on the young twigs. Cones in ours subsessile, maturing the second autumn; scales thick, spreading at maturity, with a dorsal appendage or thickening, usually armed with a spine or at least a tubercle. Seeds samara-like, with the wing remaining attached to the seed.

9. HESPEROPEUCE Lemmon. BLACK HEMLOCK, MOUNTAIN HEMLOCK.

Monococious evergreen trees with spreading branches. Leaves rather plump, keeled beneath, spreading in all directions, articulated to persistent bases (sterigmata), with stomata on both sides. Staminate aments axillary to leaves of preceding year; anther-sacs opening transversely. Pistillate aments terminal, at first erect; scales in rather many series. Cones maturing the first year; scales persistent. Seeds samara-like.

1. **H. Mertensiana** (Bong.) Rydb. A tree usually 10-20 m. high, but sometimes up to 35 m. high, with a trunk 2.5-10 dm. in diameter; leaves bluish green, rather thick, blunt-pointed, 1-2.5 cm. long; staminate flowers purple; pistillate flowers erect, dark-purple or yellowish green; cones cylindric, 3-7 cm. long; scales persistent, obovate, striate. *Tsuga Pattoniana* Sen. *T. Mertensiana* (Bong.) Sargent. *H. Pattoniana* Lemmon. Exposed ridges and slopes: Alaska.—w Mont.—Ida.—Calif. *Subalp.*

10. PICEA Link. SPRUCES.

Evergreen monoecious trees. Leaves needle-shaped, in ours quadrangular or nearly terete, leaving persistent bases (sterigmata) when falling, scattered, pointing in all directions. Staminate aments from the axils of the leaves of the preceding year, or rarely terminal; anther-sacs opening longitudinally. Pistillate aments terminal. Cones maturing the first season, drooping; scales closely imbricate, leathery, thin, without dorsal thickening, persistent. Seeds samara-like, with hyaline wings, remaining attached to the seeds.

Cone-scales rounded at the apex.

Branchlets pubescent; cones 1.5-3 cm. long, persistent for several years; scales rigid, erose or dentate.

Branchlets glabrous, cones 3-5 cm. long, deciduous in the first winter; scales rather thin.

Cone-scales entire or minutely denticulate on the margins; cones cylindric-oblong, 3.5-5 cm. long.

Cone-scales erose on the margins; cones ellipsoid, 3-3.5 cm. long.

Cone-scales more or less rhomboid in outline.

Branchlets pubescent; cones 3-5 cm. long.

Branchlets glabrous, cones 5-9 cm. long.

1. *P. Mariana*

2. *P. canadensis*

3. *P. albertiana*

4. *P. Engelmanni*

5. *P. pungens*

1. **P. Mariana** (Mill.) B.S.P. A tree usually 6-10 m. high, occasionally 25 m. high, with a trunk 1-3 dm. in diameter; bark grayish brown, scaly; twigs russet-brown, short-pilose; leaves pale blue-green and glaucous, 1-2 cm. long, callous-tipped at the apex; staminate flowers dark red; pistillate ones purple; cones short, ovoid, 1-3 cm. long, ashy brown, persistent; scales rounded, erose-dentate. *P. nigra* Link. BLACK SPRUCE. Swamps: Lab.—Newf.—N.C.—Wisc.—Sask.—Alta.—Mack. *Boreal*—*Subartic.*

2. **P. canadensis** (Mill.) B.S.P. A tree 10-20 m., rarely 30 m. high, with a trunk 3-9 dm. in diameter; bark ashy brown, scaly; branches and sterigmata glabrous; leaves incurved, acute or acuminate, blue-green; staminate flowers pale red, becoming yellow from shedding the pollen; pistillate flowers pale red or yellowish green; cones cylindric or oblong, 3-6 cm. long; scales orbicular, slightly emarginate. *P. alba* Link. WHITE SPRUCE. River banks and hill-sides: Lab.—Newf.—Me.—N.Y.—Wisc.—S.D. (Black Hills)—Alta.—Alaska. *Boreal*—*Subartic.*

3. **P. albertiana** S. Brown. A slender tree 10-20 m. high; twigs and sterigmata smooth and shining, yellowish brown, becoming darker in age; leaves pale blue-green, 1.5-2.5 cm. long, incurved, acute or acuminate; pistillate flowers bright crimson; cones ovate, 2.5-3.5 cm. long; scales stiff, rounded, cinnamon-brown. ALBERTA SPRUCE. Mountains: Alta.—n Wyo.—B.C. *Mont.*

4. **P. Engelmanni** (Parry) Engelm. A tree 25-30 m., rarely 45 m. high, with a trunk 4.5-10 dm. thick; bark light cinnamon-red, loosely scaly; leaves soft, with acute tips, 2.5-3 cm. long, bluish green; staminate flowers dark purple; pistillate ones scarlet, turning chestnut-brown; cones oblong-ellipsoid, subsessile, 3-6 cm. long; scales thin, erose-dentate. ENGELMANN'S SPRUCE. Cold mountains and ravines, especially on the north sides: Alta.—N.M.—Ariz.—B.C.—Yukon. *Subalp.*—*Mont.*

5. *P. pungens* Engelm. A tree usually 25-30 m. high, occasionally 45 m. high, and a trunk 6-9 dm. thick; bark furrowed and scaly, cinnamon-red; leaves strongly incurved, rigid, acuminate, 2-3 cm. long on the sterile branches, 1-2 cm. long on the cone-bearing ones, dull bluish green, often with a silvery bloom; staminate flowers yellow, tinged with red; pistillate ones pale green or purplish; cones usually 7-8 cm. long, oblong. *P. Parryana* (André) Sargent. COLORADO BLUE SPRUCE. Mountains, especially along streams: Wyo.—N.M.—Utah. *Mont.*

Family 2. JUNIPERACEAE. JUNIPER FAMILY.

Evergreen dioecious or monoecious trees or shrubs. Buds naked. Leaves opposite or whorled, mostly reduced and scale-like, appressed or sometimes subulate and spreading. Perianth wanting. Aments solitary, the pistillate ones with few carpellary scales. Ovules erect, 1-several under each scale. Cones often with peltate scales, in some genera fleshy. Seeds wingless or, if winged, the wings formed by a portion of the seed-coat.

Plants monoecious; cones dry; scales merely imbricate. 1. THUJA.
Plants mostly dioecious; cones berry-like or drupe-like, with coalescent fleshy scales.
Aments axillary, cones with smaller scales at the top, leaves all subulate and spreading. 2. JUNIPERUS.
Aments terminal; pistillate cones with larger scales at the top; leaves at least of the mature plants scale-like and appressed. 3. SABINA.

1. THUJA L. ARBOR VITAE, WHITE CEDAR.

Evergreen monoecious shrubs or trees. Leaves scale-like, 4-ranked, alternately opposite, usually with a gland on the back. Staminate aments terminal, solitary, nearly sessile between the leaves; anthers in 2 or 3 series, stalked; anther-sacs 4; pistillate aments solitary, terminal, ovoid or oblong; scales 2-ranked in several series. Cones oblong or ovoid, persistent; scales dry and flat. Seeds flat, winged on both sides.

1. *T. plicata* D. Don. A tree 45-50 m., sometimes 60 m. high, with a trunk 1-3 m. in diameter; bark bright cinnamon; leaves of the leading shoots ovate, long-pointed, glandular on the back, 6 mm. long, on the lateral branches acute, 3 mm. long, with no or obscure glands; staminate flowers dark brown, 3 mm. long; cones reflexed, about 12 mm. long; scales elliptic, 3-4 pairs. *T. gigantea* Nutt. Bottom lands: Alaska—Mont.—Ida.—n Calif. *Submont.*—*Mont.*

2. JUNIPERUS (Tourn.) L. JUNIPER.

Dioecious or monoecious shrubs or trees. Leaves in whorls of 3, subulate, ascending or spreading, without glands on their back. Staminate aments axillary, solitary; pollen-sacs several under each scale. Pistillate ament of 2-3 series of fleshy scales; ovules solitary. Cone berry-like. Seeds wingless.

Low shrub with depressed branches; leaves abruptly bent at the base, deeply channeled, abruptly acute. 1. *J. sibirica*.

Tree or erect shrub; leaves straight or nearly so, shallowly channeled, gradually acuminate. 2. *J. communis*.

1. *J. sibirica* Burghsd. Shrub seldom 5 dm. high, usually with decumbent branches; bark dark red, scaly; leaves 5-12 cm. long, keeled, dark green below, white above, ascending; fruit dark blue, with a bloom, 7-9 mm. in diameter; seeds 1-3, ovate, acute, angled, about 3 mm. long. *J. nana* Willd. High mountains or dry open rocky places. Lab.—N. Y.—Mich.—N.M.—Calif.—Alaska. *Subalp.*—*Mont.*

2. *J. communis* L. An erect shrub or low tree sometimes 7-8 m. high; bark dark red, scaly; leaves spreading, mostly straight, prickly-pointed, keeled, 1-2 cm. long, dark green on the lower side, white on the upper; fruit 6-7 mm. in diameter, dark blue, 1-3-seeded; seeds ovate, acute, about 3 mm. long. Dry hills: N.S.—N.J.—Pa.—w Neb.—N.M.—B.C.; Eurasia. *Submont.*—*Plain.*

3. SABINA Haller. RED CEDAR.

Evergreen monoecious or dioecious shrubs. Leaves alternately opposite or in 3's, scale-like and appressed, or in young plants subulate and more spreading,

often with a gland on the back. Staminate aments small, solitary or 3-6 together, terminal on the branchlets; pollen-sacs 3-6 under each ovate or shield-like scale. Pistillate aments subglobose, of 2-3 series of fleshy scales. Ovules erect, solitary or sometimes 2 under each scale. Cones berry-like. Seeds 1-4, wingless.

Fruit reddish-brown or bluish by a bloom, with dry fibrous sweet flesh.

1. *S. utahensis*.
Fruit blue or blue-black, rarely copper-colored, with juicy resinous flesh.
- Trees or erect shrubs, fruit on straight peduncles
- Leaves minutely dentate at the apex, fruit 5-8 mm. in diameter.
- Leaves not glandular or obscurely so; seeds usually 1
- Leaves very glandular; seeds 2 or 3.
- Leaves entire, fruit 4-5 mm. in diameter, usually with more than one seed
2. *S. monosperma*.
3. *S. occidentalis*.
4. *S. scopulorum*.
5. *S. horizontalis*.

Prostrate shrub, fruit on recurved peduncles.

1. *S. utahensis* (Engelm.) Rydb. A bushy tree, rarely 6 m. high, irregularly branched near the base; bark ashy gray or almost white, scaly; leaves in whorls of 3, or opposite on the mature branches, rhombic in outline, subacute, 2 mm. long, 1 mm. wide, neither glandular nor pitted on the back; fruit copper-colored when ripe, 7-10 mm. thick; seeds ovate, acute or obtusish, grooved. *Juniperus utahensis* (Engelm.) Lemmon. *J. Knightii* A. Nels. Dry hills: Wyo.—N.M.—Ariz.—se Calif.—Nev. *Submont.*—Son.

2. *S. monosperma* (Engelm.) Rydb. A shrub or much branched tree, up to 15 m. high; bark ashy, ridged and scaly; leaves usually in pairs, rarely in 3's, ovate, 1-2 mm. long, thick, with obscure glands or glandless; fruit globose, 5-6 mm. thick, dark blue, with a bloom; seeds broadly ovate, obtuse, angled. *J. occidentalis monosperma* Engelm. Foot-hills: s Colo.—N.M.—Ariz.—Utah; n Mex. *Son.*—*Submont.*

3. *S. occidentalis* (Hook.) Heller. A tree 5-10 m., rarely 15-18 m. high, with a trunk 6-10 dm. thick; bark cinnamon-red, fissured and scaly; leaves in 3's, appressed, ovate, acute, rounded and conspicuously glandular on the back, 2 mm. long; berries globose or elliptic, 6-8 mm. long, with thick skin, blue-black, with a bloom; seeds ovate, acute, deeply grooved on the back. *J. occidentalis* Hook. Arid hills and plains: B.C.—w Ida.—s Calif. *Submont.*—*Mont.*

4. *S. scopulorum* (Sarg.) Rydb. A tree sometimes 10-12 m. high, with rounded crown; bark dark reddish brown or grayish red, fissured and scaly; leaves opposite, appressed, acute or acuminate, with obscure glands on the back, dark green, 1-1.5 mm. long; berry globose, dark blue, with a bloom; seeds 4 mm. long, acute, angled, grooved. *Juniperus scopulorum* Sargent. Foot-hills and river bluffs: Alta.—Tex.—Ariz.—B.C. *Submont.*

5. *S. horizontalis* (Moench) Rydb. A prostrate shrub, spreading on the ground; horizontal branches sometimes 5 m. long; leaves of the mature branches ovate, opposite, acute, distinctly glandular on the back, 1-1.5 mm. long; berry-like cones on recurved peduncles, globose, 5-7 mm. long, dark blue, with a bloom, 1-3-seeded. *J. Sabina procumbens* Pursh. On banks and hillsides: N.S.—Me.—n N.Y.—Minn.—Wyo.—B.C. *Mont.*—*Submont.*

Family 3. TAXACEAE. YEW FAMILY.

Evergreen monoecious or dioecious trees or shrubs. Buds scaly. Leaves spirally arranged, but usually 2-ranked, spreading, in ours simple and linear. Staminate flowers usually in crowded aments, in ours axillary; pollen-sacs opening longitudinally. Pistillate flowers solitary. Ovules solitary, orthotropous, sessile, without carpellary scale. Fruit berry-like; seed nearly enclosed by the pulpy aril or naked; seed-coats woody or bony. Endosperm fleshy or mealy. Cotyledons 2.

1. TAXUS (Tourn.) L. YEW.

Usually dioecious evergreen trees or shrubs. Leaves linear, 2-ranked and spreading. Staminate aments short-stalked, subtended by several imbricate

bracts, axillary. Pollen-sacs 6-8 under each shield-like scale. Pistillate aments consisting of a single sessile ovule subtended by imbricate bracts. Aril accrescent into a fleshy cup. Seeds nut-like.

1. *T. brevifolia* Nutt. A tree usually 5-10 m. high, occasionally as high as 20 m., with a trunk 3-10 dm. thick; bark scaly; leaves 1-2 cm. long, yellowish green, paler beneath, slender-petioled, linear, flat, with strong midrib, spinulose-tipped; staminate flowers yellow; seed ovoid, fully 5 mm. long, 2-4 angled; aril a translucent red cup, 4-5 mm. broad. Banks of streams: Alaska—Alta.—Mont.—Calif. *Submont.*—*Mont.*

Family 4. EPHEDRACEAE. JOINT FIR FAMILY.

Shrubs or trees, with jointed opposite or fascicled branches, and scale-like opposite or whorled leaves. Plants mostly dioecious; aments with persistent bracts. Stamens monadelphous, within a bifid, membranous, calyx-like perianth; anthers dehiscent by terminal pores. Pistillate flowers of a single naked ovule, enclosed in a perianth, which becomes hardened in fruit.

1. EPHEDRA L. JOINT FIR, BRIGHAM TEA.

Characters of the family.

Scales and branches opposite, bracts opposite and connate, only the margins scarious. Scales distinct, subsistent, filaments free above 1. *E. antisyphilitica*
Scales connate, sheathing, scarious, deciduous, filaments adnate to the top of the bracts.

Branches stout, more or less spreading; plant light brownish green.

Branches slender, erect, plant bright yellowish green.

Scales, branches, and bracts in 3's, bracts scarcely connate, those of the pistillate aments nearly wholly scarious and more or less unguiculate.

Scales 2-3 mm. long, not becoming shreddy; fruit scarious.

Scales 6-12 mm. long, becoming shreddy; fruit smooth.

2. *E. nevadensis*.

3. *E. viridis*.

4. *E. Torreyana*.

5. *E. trifurca*.

1. *E. antisyphilitica* C. A. Mey. A shrub 2-3 m. high; stems slender, lax, prostrate or reclining; bark neither shreddy nor fibrous; scales triangular-ovate, 2-4 mm. long, setaceously tipped when young; aments on short bracteate peduncles; pistillate aments with 3-4 pairs of bracts, which are rounded-ovate; fruit 5-6 mm. long, smooth. Arid regions: w Tex.—s Colo. (?)—n Mex. *Son.*

2. *E. nevadensis* S. Wats. A shrub 6-10 dm. high, with diffusely spreading branches; bark becoming white and shreddy or fibrous; scales with somewhat foliaceous tips, 2-6 mm. long; staminate aments sessile or nearly so; filaments long-exserted; anthers 4-8; pistillate aments on short scaly peduncles; bracts 4 or 5 pairs, round-ovate, connate; fruit solitary or in pairs, 6-7 mm. long, exserted, smooth, acute. Arid regions: N.M.—Utah—Nev.—Calif.; n Mex. *Son.*

3. *E. viridis* Coville. An erect shrub 5-10 dm. high, with erect branches, bright yellowish green; bark becoming ash-colored; scales with slender foliaceous tips; staminate aments sessile; anthers 4-6; pistillate aments on short scaly peduncles; bracts 5 pairs, ovate; fruits in pairs, 6 mm. long, exserted. Arid regions: N.M.—Wyo.—Calif. *Son.*—*Submont.* Mr.—Je.

4. *E. Torreyana* S. Wats. An erect shrub 3-10 dm. high, with often flexuose branches, not spinose; scales short, 2-4 mm. long, subsistent; staminate aments sessile, of 6-8 whorls of broad bracts; anthers 5-8, stipitate; pistillate aments 6-10 mm. long, short-peduncled, of 5 or 6 whorls of bracts; bracts thin, broadly dilated, more or less crenate; fruit solitary, or in 3's, 7-8 mm. long. Arid regions: N.M.—s Colo.—Nev.—Ariz. *Son.*

5. *E. trifurca* Torr. An erect shrub 6-20 dm. high, with rigid branches, often spinescent; scales acuminate, persistent; staminate aments on very short peduncles, with 5 whorls of ovate bracts; anthers 4 or 5, stipitate; pistillate aments nearly sessile, 10-12 mm. long, of 8-10 whorls of very thin, scarious, entire, rounded-cordate bracts; fruit solitary, 12 mm. long, 4-sided. Arid regions: w Tex.—sw Colo.—Ariz. *Son.*

Class 2. **ANGIOSPERMAE.** SEED-VESSELED PLANTS.

Ovules enclosed in a cavity (*ovary*), formed either by one modified infolded leaf (*carpel*) with united margins, or by several united leaves. The apex of the carpel (*stigma*) is formed of and kept moist by secretive cells; when a pollen grain falls on the stigma, it germinates and sends out a tube which penetrates the tissues of the pistil till it reaches an ovule, which it fertilizes.

Subclass I. **MONOCOTYLEDONES.**

Embryo with a single seed-leaf; the first leaves alternate. Stem endogenous, *i. e.*, the fibro-vascular bundles irregularly arranged in the soft tissues, without differentiation of pith, wood, and bark. Leaves usually parallel-veined, or the secondary veins running from the midrib to the margins without ramifications. Parts of the flowers mostly in 3's or multiples of 3's.

Family 5. **TYPHACEAE.** CAT-TAIL FAMILY.

Tall water or marsh plants, with simple glabrous terete stems and creeping rootstocks. Leaves alternate, long, linear, striate, sheathing at the base. Flowers monoecious, crowded in dense terminal spike-like racemes, which are subtended by spathaceous, usually deciduous bracts; staminate spike uppermost. Perianth consisting of bristles. Stamens 2-7; filaments connate or free. Ovary 1, stipitate, 1-2-celled; styles 1-2. Fruit nut-like. Endosperm copious, mealy.

1. **TYPHA** (Toura.) L. CAT-TAIL, CAT-TAIL FLAO.

Characters of the family.

Racemes with the staminate and pistillate portions usually separate; pollen of simple grains. fruiting pedicels short, 1 mm. long or less. ¹ *T. angustifolia*.
Racemes with the staminate and pistillate portions usually contiguous; pollen-grains in 4's. fruiting pedicels bristle-like, 2-3 mm. long. ² *T. latifolia*.

1. **T. angustifolia** L. A slender perennial; stem 1-3 m. high; leaves narrowly linear, 3-15 mm. wide, striate, usually plano-convex; racemes light brown; pistillate portion 5-15 mm. in diameter, with bractlets; stigmas linear or linear-oblong; nutlets terete, not bursting in water. Marshes, mostly along the coast: N.S.—Fla.—Mex.—Calif.; Ida.; W. Ind., C. and S. Am., Eurasia. *Plains*.

2. **T. latifolia** L. A stout perennial, 1-2.5 m. high; leaves flat, 5-25 mm. wide; staminate racemes light brown, with intermixed bractlets, the pistillate ones dark brown or black, without bractlets, each 1-2 dm. long; stigmas rhomboid or spatulate; fruit furrowed, bursting in water. Marshes and shallow lakes: Newf.—Fla.—Mex.—Calif.—B.C.—Mack.; Eurasia. *Plain-Submont.* Je-Au.

Family 6. **SPARGANIACEAE.** BUR-REED FAMILY.

Marsh or water plants, with creeping rootstocks, fibrous roots, and linear alternate leaves sheathing at the base. Flowers monoecious, in dense globular heads, the staminate heads uppermost, generally sessile, the pistillate ones below, sessile or the lowest peduncled, often subtended by leafy

bracts. Perianth reduced to a few (3-6) irregular chaffy scales. Stamens usually 5, distinct. Ovary 1- (seldom 2-) celled; style 1; stigma 1, seldom 2. Fruit nut-like, 1- or 2-celled, 1- or 2-seeded. Ovules anatropous. Endosperm copious.

1. **SPARGANIUM** (Tourn.) L. BUR-REED.

Characters of the family.

Achenes broadly obovoid or cuneate-obpyramidal, sessile, long-beaked; stigmas usually 2, leaves somewhat keeled

Achenes fusiform (in *S. minimum* somewhat obovoid, but then short-beaked and short-stipitate), stigmas solitary

Stipe and beak of the fruit each 2 mm long or more; fruiting heads 1.5 cm in diameter or more; anthers 3-4 times as long as broad.

Leaves, at least the middle ones, strongly triangular-keeled; fruiting heads about 3 cm. in diameter; achenes brown, gradually tapering into the beak, which is fully as long as the body.

Leaves not keeled or only slightly so, narrow and slender, stem often floating; beak of the achenes decidedly shorter than the body.

Leaves usually 5-10 mm wide, as well as the bracts conspicuously scarious-margined, heads 1.7-2 cm in diameter, achenes gradually beaked.

Leaves 3-4 mm wide, not conspicuously scarious-margined, heads about 1.5 cm in diameter, achenes abruptly beaked

Stipe and beak of the fruit short, less than 1 mm. long; fruiting heads about 1 cm. in diameter, stigmas oblong, anthers 1.5-2 times as long as broad.

5. *S. minimum*.

1. ***S. eurycarpum*** Engelm. A stout glabrous perennial marsh plant, 5-25 dm. high; leaves linear, 5-10 dm. long, 7-10 mm. wide; inflorescence more or less compound, the branches usually with one or two pistillate heads and several staminate heads; the former compact, in fruit 2-2.5 cm. in diameter; achenes bluntly 4- or 5-angled, the top rounded, flat or even a little depressed, abruptly contracted into the style. In swamps and along streams: Newf.—Fla.—Utah—Calif.—B.C. *Plain*—*Submont.* Je—Au.

2. ***S. simplex*** Huds. A slender marsh plant, 3-7 dm. high; leaves linear, 5-9 dm. long, 8-15 mm. wide; inflorescence simple; pistillate heads 2-5, generally sessile or the lower ones peduncled, usually supra-axillary; achenes fusiform, often contracted in the middle, and gradually acuminate at the apex. In marshes and shallow water: Que.—Ont.—Wash.—B.C.; Eu. *Submont.* Je—Au.

3. ***S. multipedunculatum*** (Morong) Rydb. A rather slender marsh plant, 3-5 dm. high; leaves linear, 2-5 dm. long, slightly keeled; inflorescence simple or a little branched; staminate heads 3-5, often close together, but distant from the pistillate ones; these 2-6, the upper ones sessile, the lower peduncled, and most often axillary; achenes fusiform, gradually acuminate above. *S. simplex multipedunculatum* Morong. *S. subvaginatatum* Meinsh., in part. In shallow water: Mack.—w Ont.—Mont.—Colo.—Calif.—B.C. *Plain*—*Subm.* Je—Au.

4. ***S. angustifolium*** Michx. A slender, more or less floating water plant; leaves narrowly linear, 3-6 dm. long, flat, not keeled, often dilated at the base, floating; inflorescence mostly simple; staminate heads 2-5; pistillate ones 2-4, sessile, or the lowest one peduncled and supra-axillary; achenes fusiform, abruptly acuminate at the apex. *S. simplex angustifolium* Engelm. In deep water: Newf.—Conn.—Pa.—Colo.—Calif.—B.C. *Plain*—*Subalp.* Je—Au.

5. ***S. minimum*** Fries A slender and floating water plant; stem 1-3 dm. long, or in shallow water shorter and erect; leaves 1-4 dm. long, 1-7 mm. wide, thin and flat, usually floating; inflorescence simple; staminate heads 1 or 2, close together; pistillate heads 1-3, sessile or the lowest peduncled and axillary; body of the achenes obovoid, abruptly contracted into a short beak. Ponds and streams: Lab.—N.J.—Mich.—Utah—Ore.—Alaska; Eurasia. *Mont.*—*Subalp.* Je—Au.

Family 7. **ZANNICHELLIACEAE.** PONDWEED FAMILY.

Immersed water plants, with slender jointed, often branching stems, flat leaves, and perfect or monoecious flowers, in axillary spikes or clusters.

long; peduncles 4-7 cm. long; spike interrupted, with 2-12 flowers in each whorl; fruit ovoid, 2-3 mm. long, nearly 2 mm. thick, not keeled; stigma sessile. Ponds and lakes: Que.—N.Y.—Mich.—Wyo.—Alta. Je—Au.

18. *P. interior* Rydb. Stem slender, branched, 3-6 dm. long; leaves linear, 3-15 cm. long, about 1 mm. wide, obtuse, with a strong midrib and raised or revolute margins; peduncles 3-7 cm. long; spike interrupted; fruit obliquely ovoid, 2-grooved on the back; stigma subsessile; free portion of the stipules 2-4 mm long. *P. marinus occidentalis* Robbins. Ponds and lakes, especially in alkali water: Ont.—N.M.—Utah—Nev. Plain—Submont. Jl—Au.

19. *P. pectinatus* L. Stem slender, much branched, very leafy, 3-10 dm. long; leaves setaceous, attenuate at the apex, 3-15 cm. long, 0.1-0.5 mm. wide, sometimes nerveless; stipular sheath 1-2 cm. long; free portion 3-8 mm. long; peduncles filiform, 5-20 cm. long; spike interrupted, with several whorls of flowers; fruit obliquely ovoid, 3-4 mm. long. Fresh, salt, or alkali waters: N.B.—Fla.—L. Calif.—Alaska; Eu. Plain—Submont. Jl—S.

20. *P. Robbinsii* Oakes. Stem stout, widely branching, sometimes rooting at the nodes, 5-10 dm. long; leaves linear, acute, crowded in 2 ranks, 7-12 cm. long, 2-6 mm. wide, auricled at the point of union with the stipules; stipular sheath about 1 cm. long; free portion of the stipules 1-2 cm. long, mostly lacerate; peduncles 3-10 cm. long; spike interrupted, flowering under water; fruit obovoid, about 4 mm. long, 3 mm. thick, 3-keeled, the middle keel sharp. Ponds and lakes: N.B.—N.J.—Mich.—Ida.—Ore.—B.C. Plain. Jl—S.

2. RUPPIA L.

Slender water plants, widely branched and with capillary stems, filiform alternate 1-nerved leaves, with membranous sheaths. Peduncles spadix-like, filiform, at first very short, at last generally much elongated and spirally coiled. Flowers consisting of 2 sessile anthers, and 4 pistils, sessile at first, in fruit long-stipitate. Fruit small, more or less obliquely ovoid drupes.

Sheaths 6-10 mm. long; drupe about 2 mm. long or less.

Drupe very oblique, beak 0.5-1 mm. long.

Drupe scarcely oblique, almost beakless.

Sheaths 20-40 mm. long; drupe 3-4 mm. long.

1. *R. maritima*.

2. *R. pectinata*.

3. *R. occidentalis*.

1. *R. maritima* L. Stem slender, filiform, whitish; leaves 2-10 cm. long, 0.5 mm. or less wide; sheaths 6-8 mm. long, with a short free tip; peduncles in fruit sometimes 3 dm. long; drupes about 2 mm. long; beak almost straight or curved. *R. curvica* A. Nels. In brackish or salt water, along the coasts: Newf.—Tex.—Alaska—L. Calif.; occasionally in the interior, Sask.—Mex.; Eurasia and S. Am. Plain Je—Au.

2. *R. pectinata* Rydb. Stem intricately branched and very leafy, with very short internodes; leaves filiform, 3-6 cm. long, 0.5 mm. or less wide; sheaths 7-10 mm. long, seldom with a small rounded tip; peduncles 3-5 cm. long, in fruit recurved, but apparently not in a spiral; drupe about 1.2 mm. long, with an almost sessile stigma. In brackish ponds: Yellowstone National Park, Wyo.—Utah—Wash.—Calif. Submont.—Mont.

3. *R. occidentalis* S. Wats. Stem comparatively stout, 3-6 dm. long, with very short internodes and fan-like clustered branches; leaves 7-20 cm. long, and 0.3 mm. wide or less; sheaths with distinct free tips, often overlapping each other; peduncles sometimes 5 dm. long; stipes about 25 mm. long; drupes ovoid or pyriform, scarcely oblique; beak short, straight. In saline ponds: Neb.—B.C.—Alaska. Plain—Submont. Jl—Au.

3. ZANNICHELLIA (Mich.) L.

Slender branching aquatics, with opposite filiform leaves and sheathing membranous stipules. Flowers monoecious, sessile, naked, usually both kinds in the same axil; the staminate ones consisting of a single 2-celled anther, borne on a pedicel-like filament, the pistillate ones of 2-6 sessile pistils in a cup-shaped involucre. Fruit nut-like, obliquely oblong, flattened, with a short slender beak, ribbed or toothed on the back. Seed orthotropous.

1. *Z. palustris* L. Stem capillary from a creeping rhizome; leaves 3-7 cm. long, 0.5 mm. or less wide, acute, thin, 1-nerved, fruit 2-6 together, 2-4 mm. long, sessile or short-pedicelled; style persistent, 1-2 mm. long. In fresh and brackish ponds and ditches: Ont.—Fla.—Tex.—Calif.—B.C.; also in the Old World. *Plain*—*Submont.* Jl—O.

Family 8. NAJADACEAE. NAJAS FAMILY.

Slender submerged aquatic plants, with linear spinulose-toothed whorled or opposite leaves, sheathing at the base. Flowers monoecious or dioecious, solitary and axillary. Staminate flowers with a double perianth, the inner hyaline; stamen 1. Pistillate flowers of a single pistil, with 2-4 subulate stigmas. Fruit a small drupe.

1. NAJAS L.

Characters of the family.

Leaves 1-3 mm. wide, coarsely toothed, back of the leaves and internodes spiny; plant dioecious. 1 *N. marina*.

Leaves 0.5-1 mm. wide, finely, almost microscopically serrulate; back of the leaves and internodes unarmed. plant monoecious

Drupe shining, with 30-50 rows of indistinct reticulations 2 *N. flexilis*

Drupe dull, with 16-20 rows of strongly marked reticulations 3 *N. guadalupensis*

1. *N. marina* L. Stem stout, compressed, generally armed with teeth twice as long as broad; leaves broadly linear, 12-45 mm. long, with 6-10 spine-pointed teeth on each margin; sheaths broadly rounded; their margins entire or with a few teeth; fruit 4-5 mm. long; epicarp as well as the dull netlet rugose-reticulate. In lakes and ponds with fresh or brackish water: N.Y.—Fla.—L. Calif.—Calif. (in the range reported only from Utah); Eurasia and Austr. *Plain.* Jl—Au.

2. *N. flexilis* (Willd.) Rost. & Schmidt. Stem slender, forking, unarmed; leaves narrowly linear, 1-2 cm. long, numerous and crowded, pellucid, with 20-30 minute teeth on each margin; sheaths rounded, with 5-10 teeth on each side; fruit ellipsoid, 2-3 mm. long. In ponds and slow streams: Que.—Fla.—La.—Calif.—Ore.; Eu. *Plain.* My—Au.

3. *N. guadalupensis* (Spreng.) Morong. Stem very slender, filiform, 3-6 dm. long, branched and leafy; leaves numerous, crowded, 12-25 mm. long, 0.5-1.5 mm. wide, with 40-50 teeth on the margins; sheaths as in *N. flexilis*; fruit about 2 mm. long. *N. microdon* R. Br. In ponds and lakes: Neb.—Fla.—La.—Tex.—Ore.; Mex. and Trop. Am. *Plain.* Jl—S.

Family 9. SCHEUCHZERIAEAE. ARROW-GRASS FAMILY.

Marsh plants, with terete rush-like leaves and small perfect, spicate or racemose flowers. Perianth-segments 4 or 6, in two series. Stamens 3-6; anthers 2-celled. Carpels 3-6, 1-2-ovuled, more or less united, separating at maturity, either dehiscent or indehiscent. Seeds anatropous. Embryo straight; endosperm none.

Stem scapose; leaves all basal; flowers spicate or racemose.

Stem leafy; flowers few, in loose racemes

1. TRIGLOCHIN.

2. SCHEUCHZERIA.

1. TRIGLOCHIN L. ARROW-GRASS.

Marsh herbs, with half-round elongated linear leaves, sheathing at the base, and terminal racemes or spikes on long naked scapes. Perianth-segments in ours 6, the inner 3 inserted higher up. Stamens 6; anthers 2-celled, sessile or nearly so. Ovaries 3-6, 1-celled and 1-ovuled; style short or none; stigmas 3-6, plumose. Fruit of 3-6, cylindraceous, oblong, obovoid, or clavate carpels, united at first, at maturity separating from the base upwards. Seeds cylindraceous or ovoid-oblong, compressed or angular.

Carpels 3; fruit linear-clavate, tapering at the base.

Carpels 6; fruit oblong or ovoid, obtuse at the base.

1. *T. palustris*.

2. *T. maritima*.

1. **T. palustris** L. A slender plant, with short rootstock and slender stolons, 2-4 dm. high; leaves shorter than the scape, 1-3 dm. long, sharp-pointed; racemes 1-3 dm. long; pedicels slender, capillary, in fruit erect, 5-7 mm. long; stigmas sessile; fruit 6-7 mm. long. In bogs: Greenl.—N.Y.—Ind.—N.M.—Alaska; Eurasia and S. Am. *Plain—Mont.* JI-S.

2. **T. maritima** L. A stout plant, with subligneous rootstock, without stolons; leaves half-cylindric, 2 mm. wide; racemes often 4 dm. long or more; pedicels decurrent, 2-3 mm. long, in fruit ascending; fruit 5-6 mm. long, 3-4 mm. in diameter; carpels triangular, grooved on the back. In salt marshes: Lab.—N.J.—Calif.—Alaska; Eurasia. *Plain—Submont.* Je-S.

2. SCHEUCHZERIA L.

Rush-like bog plants, with perennial, creeping rootstock. Leaves half-round below, flat above, striate, and with membranous sheaths at the base. Perianth with 6 segments in two series. Stamens 6; filaments elongated; anthers linear, basifixed. Ovaries 3, rarely 4-6, distinct or connate at the base, 1-celled, each cell with 1-2 ovules. Fruit of 3-6 divergent foliicles, opening on the inside.

1. **S. palustris** L. A leafy bog plant, 1-2.5 dm. high; leaves 1-4 dm. long, the upper reduced to bracts; basal leaves with sheaths often 1 dm. long and ligules 1 cm. long; pedicels 6-20 mm. long, in fruit spreading; flowers white; segments 1-nerved, 3 mm. long; foliicles 5-6 mm. long. In bogs: Lab.—N.J.—Wise—Calif.—Alaska; Eurasia. *Boreal—Submont.* Je-JI.

Family 10. ALISMACEAE. WATER-PLANTAIN FAMILY.

Marsh or aquatic plants, with scapose stems, basal long-petioled sheathing, mostly cross-veined, leaves, and fibrous roots. Flowers mostly verticillate, in elongated racemes or panicles, regular, pedicelled. Sepals 3, persistent. Petals 3, deciduous. Stamens 6 or more, included. Pistils many, distinct; ovaries 1-celled and generally 1-ovuled, becoming achenes in fruit.

Carpels in a ring on a small flat receptacle; flowers perfect.

Carpels in several series on a convex receptacle, flowers monoecious or dioecious

1. **ALISMA.**

2. **SAGITTARIA.**

1. ALISMA L. WATER-PLANTAIN.

Annual or mostly perennial scapose herbs. Leaves erect or floating; blades several-veined, petioled. Flowers perfect in compound panicles. Sepals 3, usually ribbed, persistent. Petals 3, white or pinkish, spreading, deciduous. Stamens 6, two opposite each petal. Carpels few or many, in one whorl. Achenes ribbed or grooved on the back.

Achenes longer than wide, grooved on the back, their inner edges not meeting; pedicels straight, ascending

Achenes as wide as long, ribbed on the back, their inner edges meeting; pedicels recurved.

1. **A. brevipes.**

2. **A. Geyeri.**

1. **A. brevipes** Greene. Perennial; leaf-blades oblong to ovate, 5-19 cm. long, acute at the apex, rounded, truncate or subcordate at the base; scape 1 m. high or less; sepals orbicular or rounded-ovate, 3 mm. long or more; petals 5-6 mm. long; fruiting heads 5-6.5 mm. broad; achenes broadly obovate, 2.5-3 mm. long; beak ascending. **A. superba** Lunell. In water and wet places: N.S.—N.D. N.M.—Calif.—B.C. *Plain—Mont.*

2. **A. Geyeri** Torr. Perennial; leaf-blades oblong to ovate-lanceolate, rarely lance-linear, 5-9 cm. long, acute at both ends; scapes mostly 1-5 dm. long, diffusely spreading; sepals rounded-ovate, about 2-5 mm. long; petals 2-4 mm. long; fruiting heads 4.5-5.5 mm. broad; achenes suborbicular; beaks erect. Wet places: w N.Y.—N.D.—Nev.—Ore. *Plain—Submont.*

2. SAGITTARIA L. ARROW-HEAD, SWAN OR SWAMP POTATO.

Perennial water or bog plants, with tuber-bearing or nodose rootstocks. Leaves long-petioled, with a sagittate or lanceolate blade or, especially the earlier ones, reduced to bladeless phylloids. Flowers monoecious or dioecious, borne

in verticils of 3's near the top of the scapes, pedicelled, the staminate uppermost. Sepals and petals 3; the latter large, white. Stamens numerous, inserted on the convex receptacle; anthers 2-celled, dehiscent by lateral slits. Pistillate flowers with numerous pistils. Achenes densely aggregated in globular heads, flat and often wing-margined.

Leaf-blades usually without basal lobes; beak borne below the top of the achenes

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|--|---------------------------|
| Leaf-blades or some of them sagittate or hastate, with basal lobes, beak borne at the top of the achenes | 1. <i>S. graminea</i> . |
| Beak short, erect, bracts lanceolate or linear-lanceolate. | |
| Basal lobes of the leaves acute or acuminate. | 2. <i>S. cuneata</i> . |
| Basal lobes of the leaves rounded or obtuse | 3. <i>S. hebetiloba</i> . |
| Beak of the achenes horizontal | |
| Beak short, basal lobes of the leaves at least twice as long as the terminal one; bracts lanceolate. | 4. <i>S. longiloba</i> . |
| Beak long; basal lobes of the leaves usually shorter than the terminal one; bracts ovate. | 5. <i>S. latifolia</i> . |

1. *S. graminea* Michx. Plant emersed or submerged, 1-6 dm. high; phylloids if present, flattened, linear-lanceolate, acute, 8-30 cm. long, 1-2 cm. wide; leaf-blades lanceolate to ovate-elliptical, acute at both ends, or very rarely truncate, with short divaricate lobes at the base, 5-15 cm. long, 3-5-ribbed; bracts ovate, acute, 3-5 mm. long, connate to the middle; fruiting heads 5-10 mm. in diameter; achenes 1.5 mm. long, dorsally crested and obliquely one-ribbed on the sides. In shallow ponds and marshes: Newf.—Fla.—Tex.—Sask. *Plain*.

2. *S. cuneata* Sheld. A rather weak plant growing in mud or water, glabrous, 2-4 dm. high; leaves when emersed sagittate; petiole rather stout, usually curving outwards; blade 6-18 cm. long; basal lobes narrow, lanceolate, somewhat divergent; blades in deep water less developed, sometimes not lobed, floating; bracts lanceolate or linear-lanceolate, acute, 8-20 mm. long, scarious-margined; fruiting heads 10-15 mm. in diameter; achenes 2 mm. long, winged on both margins. *S. arifolia* Nutt. In mud and shallow water: Me.—N.D.—Conn.—Kans.—N.M.—Calif.—B.C. *Plain—Submont.*

3. *S. hebetiloba* A. Nels. A rather stout plant, 2-5 dm. high, monoecious; leaf-blades sagittate, 8-14 cm. long, subacute; bracts linear-lanceolate, 15-20 mm. long, subscarious; corolla about 2 cm. in diameter; fruiting heads 10-15 mm. in diameter; achenes about 2 mm. long, winged on both margins and the summit. In a bog, formed from warm-spring: Laramie Co., Wyo. *Submont.*

4. *S. longiloba* Engelm. A monoecious, slender, erect perennial, 3-5 dm. high; leaf-blades sagittate; basal lobes linear-lanceolate, acuminate; fruiting heads 10-12 mm. in diameter; achenes 2 mm. long, narrowly winged on both margins; beak lateral. In shallow ponds: Neb.—Colo.—Tex.—Sonora. *Plain—Son.*

5. *S. latifolia* Willd. A rather stout plant, monoecious, 3-6 dm. high; with the lower verticils fertile, or rarely dioecious, 3-6 dm. high; leaf-blades sagittate, 15-40 cm. long, very variable, glabrous; lobes from broadly ovate to linear-lanceolate [v. *angustifolia*], acute or acuminate; bracts ovate, acute, 1-3 cm. long; flowers 3-4 cm. wide; fruiting heads 15-30 mm. in diameter; achenes about 3 mm. long, winged on both margins; beak triangular-lanceolate, acuminate, making almost a right angle to the achenes. Shallow water: N.B.—Fla.—Calif.—B.C. Mex. and C. Am. *Son.—Plain—Mont.* Je-S.

Family 11. **ELODEACEAE.** WATER-WEED FAMILY.

Submersed or floating water plants. Leaves in ours opposite or whorled. Plants monoecious, dioecious or polygamous. Flowers enclosed in a spathe of 1-3, usually united bracts. Hypanthium in the pistillate flowers well developed, tubular, in the staminate flowers often shorter or obsolete. Perianth regular or nearly so. Sepals 3. Petals 3, or wanting. Stamens 3-9; filaments short, often monadelphous. Pistil single, compound. Ovary 1-celled with 2-6, usually 3, parietal placentae. Ovules numerous. Fruit indehiscent, maturing under water.

1. *PHILOTRIA* Raf. WATER-WEED.

Submerged water plants with elongated branched stems, often rooting at the nodes, dioecious or polygamo-dioecious. Leaves opposite or whorled, sessile, pellucid, 1-nerved. Spathe 2-cleft at the apex, that of the staminate plant oval or obovate, sessile, stipitate, in the pistillate plant lanceolate and sessile. Sepals and petals 3 or the latter lacking. Stamens in the staminate flowers usually 9, in two series, in the inner series 3; in the hermaphrodite usually only 3. Fruit linear or lance-linear. [*Elodea* Michx.]

Staminate flowers sessile, breaking off within the spathe; petals wanting.

Staminate flowers on elongating pedicels, carrying them to the water surface; petals present.

1. *P. Planchonii*.

2. *P. iowensis*.

1. *P. Planchonii* (Casp.) Rydb. Dioecious water plant; stem slender, 1-10 dm. long; leaves in 3's or the lower opposite, oblong to linear, 7-15 mm. long, 1-2 mm. wide, acutish; spathe of the staminate plant obovoid-clavate, nearly 1 cm. long, on a stipe 5-10 mm. long; sepals elliptic, 5 mm. long; petals lacking; spathe of the pistillate plant lance-linear, sessile; tube of the hypanthium 3-5 cm. long; sepals and petals linear, about 3 mm. long. Lakes and ponds: Sask.—Colo.—Nev. *Plain*—*Submont.*

2. *P. iowensis* Wylie. Dioecious water plant; leaves lanceolate to oblong-linear, 8-14 mm. long, 2-3.5 mm. wide; spathe of the staminate flowers obovate, contracted to a narrow base; sepals oval, 4 mm. long; petals linear-lanceolate, acuminate; spathe of the pistillate flowers linear-cylindric, 1-1.5 cm. long; hypanthium 3-15 cm. long; sepals oval, 2 mm. long; petals obovate; staminodia 3. Lakes: Iowa—Colo. *Plain.*

FAMILY 12. *POACEAE*. GRASS FAMILY.

Annual or perennial herbs, or in warmer climates sometimes trees or vines. Stems (culms) usually hollow except at the nodes. Leaves sheathing at the base; the sheaths usually split on the side opposite the blades. Inflorescence spicate, racemose or paniculate, consisting of spikelets composed of usually 2-ranked bracts called glumes, the lower 1-4, usually 2, empty, the remaining (lemma) enclosing a bract-like organ (the palea), and inside this a flower, usually consisting of 3 stamens and 1 pistil. Ovary 1-celled, 1-seeded. Styles 1-3, usually 2. Fruit a seed-like grain (caryopsis), in some exotic species nut-like or berry-like.

Spikelets falling from the pedicels entire, naked or enclosed in bristles or bur-like involucres, 1-flowered, or if 2-flowered the lower flower staminate; no upper empty glumes; rachilla not extending above the upper glume.

Spikelets round or somewhat compressed dorsally; empty glumes manifest; hilum punctiform.

Lemma and palea hyaline, thin, much more delicate in texture than the empty glumes.

Spikelets in pairs, one sessile and the other pedicellate.

Spikelets not in pairs (*Alopecurus*, *Polypogon*, *Cinna*, etc.)

Lemma, at least that of the perfect flower, similar in texture to the empty glumes, or thicker and firmer, never hyaline and thin

Lemma and palea membranous; the first glume usually larger than the rest.

Lemma and palea chartaceous to coriaceous, very different in color and appearance from the remaining glumes.

Spikelets much compressed laterally; empty glumes none or rudimentary; hilum linear.

Spikelets with the empty glumes persistent, the rachilla articulated above them, 1-many-flowered; upper lemmas frequently empty; rachilla often produced beyond the upper lemma.

Spikelets borne in an open or spike-like panicle or raceme, usually upon distinct pedicels.

Spikelets 1-flowered.

Empty glumes 4; palea 1-nerved.

Empty glumes 2, rarely 1; palea 2-nerved (except in *Cinna*.)

Tribe 5. *PHALARIDEAE*.

Tribe 6. *AGROSTIDEAE*.

Tribe 4. *ORYZAE*.

Tribe 3. *PANICEAE*.

Tribe 2. *ZOYBIAE*.

Tribe 1. *ANDROPOGONIAE*.

Spikelets 2-many-flowered.

Lemma usually shorter than the empty glumes; the awn dorsal and usually bent. Tribe 7. AVENAE.

Lemma usually longer than the empty glumes; the awn terminal and straight (rarely dorsal in *Bromus*) or none. Tribe 9. FESTUCEAE.

Spikelets in two rows, sessile or nearly so.

Spikelets on one side of the continuous axis, forming one-sided spikes

Spikelets alternately on opposite sides of the axis, which is often articulated. Tribe 8. CHLORIDEAE. —

Tribe 10. HORDEAE.

TRIBE 1. ANDROPOGONEAE.

Racemes singly disposed; apex of the rachis-internodes with a translucent cup-shaped appendage. 1. SCHIZACHYRIUM.

Racemes disposed in pairs or more; apex of the rachis-internodes not appendaged.

Rachis-internodes and pedicels sulcate, the median portion translucent, the margins thickened. 2. AMPHILOPHIS.

Rachis-internodes not sulcate.

Some or all of the racemes sessile.

All of the racemes more or less peduncled. 3. ANDROPOGON.

Pedicellate spikelets wanting.

Pedicellate spikelets present and usually staminate. 4. SORGHASTRUM.

5. HOLCUS.

TRIBE 2. ZOYSIEAE.

Only one genus represented.

6. PLEURAPHIS.

TRIBE 3. PANICEAE.

Spikelets naked, not involucrate.

Empty glumes 2.

Rachis produced beyond the upper spikelet; spikelets narrow.

39. SPARTINA.

Rachis not so produced; spikelets globose or obovoid.

Spikelets obovoid, turgid.

40. BECKMANNIA.

Spikelets plano-convex.

7. PASPALUM.

Empty glumes 3

Empty glumes not awned.

Spikelets in very slender 1-sided racemes, which are usually whorled or appressed. 8. SYNTHESISMA.

Spikelets in panicles or panicle racemes.

Spikelets lanceolate, acuminate, long-hairy.

9. VALLOTA.

Spikelets orbicular or lanceolate, if the latter, then glabrous

10. PANICUM

Empty glumes awned or awn-pointed.

11. ECHINOCHLOA.

Spikelets involucrate.

Involucre of bristles.

12. CHAETOCHELOA.

Involucre of two spine-bearing valves.

13. CENCHRUS.

TRIBE 4. ORYZEAE.

Spikelets perfect; empty glumes wanting or rarely rudimentary.

14. HOMALOCENCHRUS.

TRIBE 5. PHALARIDEAE.

Third and fourth glumes empty, awnless.

15. PHALARIS.

Third and fourth glumes enclosing staminate flowers.

16. TORRESIA.

TRIBE 6. AGROSTIDEAE.

Lemma indurate when mature and very closely embracing the grain, or at least firmer than the empty glumes

Spikelets all perfect, not in pairs.

Lemma 3-awned.

17. ARISTIDA.

Lemma 1-awned or awnless.

Awn twisted and bent.

18. STIPA.

Awn not twisted.

Lemma broad; awn deciduous.

Inflorescence paniculate or racemiform.

19. ORYZOPSIS.

Inflorescence dichotomous.

20. ERIOCOMA.

Lemma narrow, glabrous or with short, appressed hairs; awn, if any, persistent.

21. MUHLBERGIA.

Spikelets in pairs, one perfect and the other staminate or sterile, in a spike-like panicle.

22. LYCURUS.

Lemma usually hyaline or membranaceous at maturity, at least more delicate than the empty glumes.

Stigma sub-plumose (i. e., with short hairs all around), projecting from the apex of the nearly closed glumes.

Inflorescence spike-like

Rachilla of the spikelets articulated above the empty glumes, which are therefore persistent. 23. PHLEUM.

Rachilla of the spikelets articulated below the empty glumes, hence the spikelets falling off entire. 24. ALOPECURUS.

Inflorescence an open small panicle; dwarf arctic-alpine plant.

25. PHIPPSIA.

- Stigma plumose, projecting from the sides of the spikelets; inflorescence an open or spike-like panicle
 Grain not permanently enclosed in the lemma and palea; pericarp opening readily at maturity.
 Flowering glumes long-hairy on the veins 26. BLEPHARONEURON.
 Flowering glumes not long-hairy on the veins. 27. SPOROBOLUS.
 Grain permanently enclosed in the lemma and the palea; pericarp adherent.
 Spikelets readily falling off when mature 28. POLYPOGON.
 Spikelets with the empty scales at least persistent.
 Palea 1-nerved and 1-keeled; stamen 1. 29. CINNA.
 Palea 2-nerved and 2-keeled or sometimes wanting; stamens 3.
 Lemma naked at the base. 30. AGROSTIS.
 Lemma with long hairs at the base.
 Flowering glume and palea thin-membranous. 31. CALAMAGROSTIS.
 Flowering glume and palea chartaceous. 32. CALAMOVILFA.
- TRIBE 7. AVENEAE.
- Awn of the lemma inserted dorsally below the teeth.
 Flowers all perfect or the upper staminate.
 Grain free, unfurrowed; spikelets less than 1 cm. long
 Lemma erose-toothed or shortly 2-lobed at the apex. 33. DESCHAMPSIA.
 Lemma 2-cleft or deeply 2-toothed at the apex; teeth awn-pointed.
 Awn twisted and bent. 34. TRISTETUM.
 Awn if present not twisted, straight. 35. GRAPHEPHORUM.
 Grain furrowed, adherent to the glumes; spikelets exceeding 1 cm. in length.
 Ovary not crowned by a villous appendage. 36. AVENA.
 Ovary crowned by a villous appendage (awned species of)
 Upper flowers perfect, the lower staminate 70. BROMUS.
 Awn of the lemma inserted between the teeth. 37. ARRHENATHERUM.
 38. DANTHONIA.
- TRIBE 8. CHLORIDEAE.
- Plants with perfect flowers.
 Spikelets with 1 (rarely 2) perfect flowers.
 Spikelets deciduous as a whole; rachis articulated below the empty glumes.
 Rachis produced above the upper spikelet; spikelets narrow.
 39. SPARTINA.
 Rachis not produced above the upper spikelet; spikelets globose.
 40. BECKMANNIA.
 Spikelets with at least the empty glumes persistent.
 Glumes above the perfect flower none, spikes digitate, very slender.
 41. SCHEDONNARDUS.
 Glumes above the perfect flower 1-several; spikes scattered.
 Spikes closely approximate, subverticillate. 42. CHLORIS.
 Spikes scattered. 43. BOUTELOUA.
 Spikelets with 2-3 perfect flowers; spikelets alternate. 44. LEPTOCLOA.
 Plants dioecious; spikelets of the two sexes very unlike. 45. BULBILIS.
- TRIBE 9. FESTUCEAE.
- Lemmas, at least of the pistillate spikelets, 3-lobed and 3-awned; plant dioecious. 46. SCLEROPOGON.
 Lemmas entire or at most 3-lobed.
 Hairs on the rachilla or the lemma very long and enclosing the latter.
 47. PHRAGMITES.
 Hairs, if any, on the rachilla and the lemma shorter than the latter.
 Stigmas barbellate on elongated styles, spikelets in threes in the axils of spinescent leaves.
 48. MUNROA.
 Stigmas plumose, sessile or on short styles.
 Lemma 1-3-nerved
 Lateral nerves of the lemmas hairy.
 Lemma deeply 3-lobed
 Internodes of the rachilla long, often half as long as the lemma;
 plants without stolons. 50. TRIPLASIS.
 Internodes of the rachilla short, many times shorter than the lemmas.
 Fertile flower one, with 2 empty lemmas below and one above.
 49. BLEPHARIDACHNE.
 Fertile flowers 3 or more, with no empty lemmas below.
 51. DASTOCHLOA.
 Lemma entire or slightly 2-lobed; internodes of the rachilla short.
 Inflorescence a short congested raceme; leaf-blades with thick cartilaginous margins. 52. ERIONEURON.
 Inflorescence a panicle, leaf-blades not with cartilaginous margins.
 Panicle simple or compound, the spikelets on pedicels of varying length. 52. TRIDENS.
 Panicle composed of long branches, along which the appressed spikelets are arranged on short pedicels.
 54. DIPLACHNE.
 Lateral nerves of the lemmas glabrous.
 Callus of the lemma copiously pubescent with long hairs; panicle open.
 55. REDFIELDIA.

base, pubescent towards the apex; awn straight, 4-10 mm. long or sometimes wanting; pedicellate spikelet awnless, usually larger than the sessile one, staminate. Sandy soil: N.D.—Miss.—Mex.—Mont. *Plain—Son.* Jl-S.

4. *A. paucipilus* Nash. Stem 1-1.5 m. tall, stout; sheaths smooth and glabrous, leaf-blades 3 dm. long or less; racemes in 2's-3's, 5-7 cm. long, exserted; sessile spikelets 9-10 mm. long; outer 2 glumes hispid on the nerves toward the apex, pubescent towards the summit; awn almost none; pedicellate spikelet similar to the sessile one, staminate. Dry soil: Mont.—Neb. *Plain.* Jl.

4. *SORGHASTRUM* Nash. INDIAN GRASS.

Perennials with rootstocks. Panicles large, with the principal branches solitary but branching near the base and hence appearing verticillate. Sessile spikelet dorsally compressed; empty glumes 3, the outer two indurate, often hairy, the third hyaline. Lemma hyaline, with a long awn, which is spiral at the base. Pedicellate spikelet wanting or rudimentary, usually represented merely by a hairy pedicel at one side of the sessile spikelet, or at the ends of the branches by two pedicels, one on each side. Styles distinct; stigmas plumose.

1. *S. nutans* (L.) Nash. Perennial, with a scaly rootstock; stems 1-2.5 m. high; leaf-sheaths usually smooth and glabrous; blades 3-6 dm. long, 5-13 mm. wide, very rough; panicles 2-5 dm. long, loose, the apex usually nodding; spikelets 6-8 mm. long, lanceolate, the 2 outer glumes golden-brown, the first one densely pubescent with long erect hairs; awn geniculate, 1-1.5 cm. long, closely spiral up to the bend, then loosely twisted. *Andropogon nutans* L. *Chrysopogon nutans* A. Gray. Meadows: Ont.—Fla.—Tex.—Ariz.—Sask.; n Mex *Plain—Submont—Son.* Jl-S.

5. *HÓLCUS* L. JOHNSON GRASS, BROOM CORN, SUGAR CORN.

Perennials with rootstocks, or annuals. Branches of the large panicle verticillate. Spikelets in pairs or at the ends of the branches in 3's, 1 sessile and pistillate, 1 or 2 pedicelled and staminate or neutral. Empty glumes 3, the outer two indurate, the third hyaline. Lemma hyaline, awned, or awnless. Styles distinct; stigmas plumose [*Sorghum* Pers]

1. *H. halapense* L. Perennial; stem 5-15 dm. tall; leaf-blades 2-5 dm. long, 0.5-3 cm. wide; panicle 1.5-5 dm. long, oblong to oval; sessile spikelet 4 5-5 5 mm long, ovoid, the two outer glumes densely appressed-pubescent; awn readily deciduous, 1-1.5 cm. long; pedicellate spikelets 5-7 mm. long, lanceolate, the 2 outer glumes sparingly pubescent. *Sorghum halapense* Pers. JOHNSON GRASS. In fields and waste places: Pa.—Fla.—Tex.—Colo.; Calif., Mex., C. Am. and S Am.; escaped from cultivation. Je-D.

6. *PLEURAPHIS* Torr. BLACK BUNCH-GRASS, GALLETA GRASS, TOBOSA GRASS.

Tufted perennials with scaly rootstocks. Spikelets in sessile clusters of three, forming a spike-like inflorescence; central spikelet 1-flowered, the lateral ones of 2 staminate flowers. Glumes 3 in the central flower, the outer two-ridged, the first larger, 2-toothed at the apex, awnless or with an awn between the teeth, the second narrower and keeled, the third thin-membranous and like the lemma. Glumes of the lateral flowers only two. Styles a little united at the base; stigmas short-plumose

Stem and leaf-sheath, at least the lower ones, densely woolly.

1 *P. rigida*

Stem and leaf-sheath not woolly

Outer glumes of the spikelets cuneate, awnless; nerves strongly divergent.

2. *P. mutica*.

Outer glumes linear or oblong, awned, nerves parallel.

3 *P. Jamesii*.

1. *P. rigida* Thurb. Stem 3-8 dm. high, branching, covered with a dense tomentum; leaf-blades 3-12 cm. long, rigid, 3-5 mm. wide, often involute; spike 3-10 cm. long; glumes of the central perfect spikelet cuneate at base, bifid above, fringed with wool; awn divergent, a little exceeding the glume; glumes of the lateral spikelets irregularly toothed above; awns short, straight or recurved. *Hilaria rigida* Benth. Desert regions: s Utah—Ariz.—s Calif.—L. Calif. *L. Son.* Ap-Je.

2. *P. mutica* Buckl. Stems 2-6 cm. high, smooth and glabrous; blades 3-10 cm long, involute, scabrous; spikes dense, 3-6 cm. long, 5-12 mm. thick; spikelets usually overlapping; lower glumes of the middle spikelet narrow, keeled, bearing 5-6 bristles; those of the lateral spikelets 4-5 mm. long, cuneate, the outer one 6-9-nerved with a rounded scarious margin, the inner 4-nerved with a short awn. *H. mutica* Benth. TOBOSA GRASS. Dry plains: Tex.—Colo.—Ariz; Mex. Son. Ap-S.

3. *P. Jamesii* Torr. Stem slightly hairy at the nodes, otherwise scabrous or smooth, 1.5-4 dm. high; blades 1-15 cm. long, glaucous and scabrous, usually revolute; spikes 5-8 cm. long, often purple-tinged; glumes of the middle spikelet keeled, ciliate, 2-cleft, with 3-7 bristles on the back, lower glume of the lateral spikelets 6-7 mm. long, awned above the middle; upper glume emarginate, cuspidate. *H. Jamesii* Benth. GALLETA GRASS. Hills and plains. Tex—Wyo.—Nev.—N M. Plain—Submont.—Son. My-Au.

7. *PASPALUM* L. *PASPALUM*.

Usually perennials with rootstocks. Inflorescence of one or more unilateral racemes; spikelets 1-flowered, arranged singly or in pairs alternately in two rows on one side of a flattened and more or less winged rachis. Glumes 2, rarely 3, membranous. Lemma glabrous and shining, convex, with its back turned towards the rachis, at last indurate. Styles distinct, long; stigmas plumose.

1. *P. stramineum* Nash. Stem 2-8 dm. high; sheaths all but the lowest ones glabrous, except the ciliate margins, blades yellowish-green, long-ciliate on the margins, 5-25 cm. long, 5-10 mm. wide; racemes 4-10 cm. long, usually in pairs; spikelets in pairs, orbicular, 2 mm. broad; first glume 3-nerved, pubescent; second glume 2-nerved, glabrous or nearly so. *P. setaceum* A. Nels., not Michx. Sandy places. Neb.—Okla.—Colo. Plain. Jl-S.

8. *SYNTHÉRISMA* Walt. CRAB-GRASS.

Annual grasses. Inflorescence composed of spike-like racemes, which are disposed in whorls, or approximate at the summit of the stems. Spikelets narrow, acute, in 2's or 3's on one side of the flat and winged or triangular rachis, one of the spikelets generally longer-pedicelled than the rest. Glumes membranous, the first small or wanting, the lemma chartaceous, glabrous and shining, at length indurated, enclosing a palet. Styles distinct; stigmas plumose. [*Digitaria* Scop., not Heist.]

Pedicels terete or nearly so, sparingly if at all hispidulous, lower sheaths glabrous, lemma brown in fruit.

Spikelets more than 2 mm long

1 *S. Ischaemum*

Spikelets 1.25-1.5 mm long

2 *S. panicum*

Pedicels sharply 3-angled, the angles strongly hispidulous, as also the sheath, lemma white in fruit.

Spikelets about 2.5 mm long, third glume with the nerves strongly hispid above the middle

3 *S. sanguinale*

Spikelets 3 mm long or more, third glume with the nerves smooth or nearly so

4 *S. marginatum*.

1. *S. Ischaemum* (Schreb.) Nash. Stems 2-5 dm. long, at last prostrate and rooting; leaf-blades 1.5-13 cm long, 2.5-6 mm. wide, smooth and glabrous on both sides; racemes 2-5, 2-8 cm long; spikelets fully 2 mm. long, elliptic, acute, first glume rudimentary or wanting. *Panicum lineare* Krock., not L. *P. glabrum* Gaud. *Syntherisma humifusum* (Pers.) Rydb. Waste places, fields, and roadsides. N S —Fla —Colo.—Mont.; introduced from Eu. Plain—Mont. Jl-S.

2. *S. panicum* (Sw.) Nash. Stem tufted, 1-4.5 dm. high, glabrous; sheaths glabrous; blades glabrous, up to 1 dm. long, 6 mm. wide; racemes 3-5, digitate, up to 1 dm long; rachis winged; spikelets about 1.3 mm. long, white, acute, elliptic; first glume wanting, second and third subequal, nearly equalling the lemma, appressed-pubescent, 3-5-nerved. Waste places: n Mex.—Colo.—W Ind; also in the Old World. Son.

3. *S. sanguinale* (L.) Dulac. Stem 3-10 dm high, prostrate at the base and rooting; leaf-blades 4-20 cm long, 4-10 mm wide, more or less papillose-hirsute

on both sides; racemes 3-10, linear, 5-18 cm. long; spikelets elliptic-lanceolate, acute; first glume minute, triangular; lemma apiculate, elliptic-lanceolate *P. sanguinale* L. CRAB-GRASS. Cultivated ground and waste places Mass.—Fla.—Calif.—Wash.; Mex.; naturalized from the Old World Je-S.

4. ***S. marginatum*** (Link) Nash. Stem 5-8 dm. long, prostrate at the base and rooting at the nodes; sheaths densely papillose-hirsute; blades 5-8 cm long, 3-10 mm wide, flat, glabrous or pubescent; racemes 2-9, variously disposed, 2-12 cm. long, spikelets 3-4 mm. long, lance-oblong; first glume minute, triangular, glabrous; second and third glumes long-pubescent; lemma elliptic Waste places: Md.—Fla.—Mex.—Utah; W. Ind, C Am, and S Am.

9. **VALLÖTA** Chase.

Perennial grasses, with usually tufted stems, panicles usually densely hairy, narrow or contracted. Spikelets numerous, articulated below the empty glumes, 1-flowered, lanceolate, acute or acuminate. Glumes 3, membranous, the second and usually also the much shorter first densely silky-pilose or long ciliate on the margins, often acuminate, and sometimes with a short bristle at the apex. the lemma shorter, chartaceous, glabrous and shining, finally indurated, enclosing a shorter palet. Styles distinct; stigmas plumose.

1. ***V. saccharata*** (Buckl.) Chase Erect perennial, stem 3-9 dm. high, usually much-branched below; sheaths mostly exceeding the internodes, glabrous or papillose-hirsute; leaf-blades 5-15 cm. long, flat, 5 mm wide or less, more or less pubescent; panicle 1-2 dm. long; spikelets 3-3.5 mm. long, acute; first glume minute, second and third glumes densely silvery-villous. *Panicum saccharatum* Buckl. *P. lachnanthum* Torr. *Trichacne saccharatum* Nash. Dry hillsides Tex —Colo.—Ariz.; Mex Son —Submont. My—S.

10. **PANICUM** L. PANIC-GRASS, WITCH-GRASS

Annuals or perennials. Spikelets in open or contracted panicles, 1-2-flowered, lanceolate, oblong, ovate to obovate or globose, obtuse to acute or acuminate. Glumes 3, membranous, the first and second empty, the first usually much shorter than the spikelet, sometimes minute, the third one empty or enclosing a shorter hyaline palet and often also a staminate flower; lemma shorter and usually more obtuse than the glumes, chartaceous, glabrous and shining, at length indurated, enclosing a palet. Styles distinct; stigmas plumose.

Inflorescence truly paniculate.

Basal leaf-blades long and narrow, spikelets lanceolate or ovate, acute or acuminate.

Annuals

Branches of the panicle widely spreading, the well developed pulvinus in their axils long-hairy; spikelets lanceolate, acuminate 1 *P. barbipulvinatum*

Branches of the panicle ascending, rarely spreading, the pulvinus glabrous or sparingly hairy, spikelets ovate to ellipsoid, acute 2 *P. capillare*

Perennials, with long scaly rootstocks and stolons 3 *P. virgatum*

Basal leaf-blades ovate to lanceolate, obtuse

Spikelets less than 2 mm long

Stem and sheaths sparingly pubescent, with spreading papillate hairs

Vernal leaves glabrous or nearly so on the upper side

Autumnal stems branching from the lower nodes, forming a spreading bunch, 1-1.5 dm high 4 *P. occidentale*

Autumnal stems branching from the middle nodes, forming widely spreading mats 5 *P. tennesseense*

Vernal leaves pubescent on the upper side, especially towards the base

Spikelets 1.8-2 mm long, autumnal form decumbent-spreading 6 *P. pacificum*

Spikelets 1.6-1.8 mm long, autumnal form not decumbent-spreading. 7 *P. huachucae*

Stem and sheaths densely soft-pubescent, hairs scarcely papillate 8 *P. thermale*

Spikelets more than 2 mm long

Blades of stem-leaves elongated, narrowly linear

Spikelets glabrous or with a few scattered hairs, stem branching only at the base 9 *P. perlongum*

Spikelets densely pubescent, stem branching above 10 *P. Wilcoxianum*

Blades of stem-leaves lanceolate 11 *P. Scribnerianum*

Inflorescence with racemiform branches 12 *P. obtusum*

1. *P. barbipulvinatum* Nash. Annual, stem at length branched and rooting at the nodes; sheaths densely pubescent with spreading hairs, papillate at the base, blades hairy on both sides, 4-13 cm. long, 5-10 mm. wide; panicles ovate, 1-2 dm. long, spikelets 3-3.5 mm. long; first glume less than one-half as long as the spikelet, broadly ovate, 3-nerved; second and third glumes pubescent at the apex. WESTERN WITCH-GRASS. Wet sandy soil: Minn.—Kans.—Wyo.—Ore.—B.C. Plain—Submont. JI-S.

2. *P. capillare* L. Erect or decumbent annual; stem 2-8 dm. high, simple or sparingly branched; sheaths papillose-hirsute; leaf-blades 1.5-3 dm. long, 5-15 mm. wide, pubescent; terminal panicle 2-3.5 dm. long; lateral ones when present smaller, spikelets 2-2.5 mm. long, somewhat acuminate or acute; first glume $\frac{1}{4}$ - $\frac{1}{2}$ as long as the spikelet, 5-7-nerved; second and third glabrous. WITCH-GRASS. Dry or sandy soil and waste places: N.S.—Fla.—Tex.—Nev.—Wash.—B.C. Plain. Je-S.

3. *P. virgatum* L. Perennial with a creeping, scaly rootstock; stem 1-2 m. high, glabrous; sheaths smooth; leaf-blades elongated, 3 dm. long or more, 6-12 mm. wide, flat, rough on the margins; panicle 1.5-5 dm. long; spikelets ovate, acuminate, 4-4.5 mm. long; first glume acuminate, about half as long as the spikelet, 3-5-nerved; second glume usually longer than the rest. Meadows and plains. Me.—Fla.—Tex.—Ariz.—Sask.; W. Ind. and C. Am. Plain—Son. Au-S.

4. *P. occidentale* Scribn. Tufted perennial, yellowish green; stem 1.5-4 dm. high, with short lower internodes, blades 4-8 cm. long, 5-7 mm. wide, glabrous or with a few hairs towards the base above, appressed-pubescent beneath; panicle long-exserted, 4-7 cm. long, lax, with flexuose spreading branches, spikelets about 1.8 mm. long, obovate, acute, pubescent; first glume one-fourth as long as the spikelet or less, second and third glumes subequal, as long as the fruit. Bogs and sandy ground. B.C.—Ida.—Calif. Submont.

5. *P. tennesseense* Ashe. Perennial, at first spreading; stem 2.5-6 dm. high; sheaths spreading-pubescent; leaf-blades 6-9 cm. long, often ciliate at the base, glabrous or with a few hairs towards the base above, appressed-pubescent beneath; panicle 4-7 cm. long, rather dense; spikelets 1.6-1.7 mm. long, obovate, obtuse, pubescent; first glume about one-fourth as long as the spikelet; second glume shorter than the third. Open moist ground: Me.—Ga.—Miss.—Utah. Plain—Submont.

6. *P. pacificum* Hitchc. & Chase. Tufted perennial; stem 2.5-5 dm. high, leaf-blades 5-10 cm. long, 5-8 mm. wide, acuminate, papillose-pilose, with shorter hairs intermixed, appressed-pubescent beneath; panicle short-exserted, 5-10 cm. long, with flexuose ascending branches; spikelets obovate, obtuse, papillose-pubescent; first glume one-fourth to one-third as long as the spikelet, truncate; second and third glumes equalling the fruit. Sandy shores: B.C.—Ida.—Ariz.—Calif. Plain—Submont.

7. *P. Huachucae* Ashe. Erect or ascending perennial, at length much branched; stems 2-6 dm. high; leaf-blades lanceolate or lance-linear, acuminate, pubescent beneath with short hairs, 4-10 cm. long, 5-12 mm. wide; panicle 5-10 cm. long, usually purplish; branches spreading, few-flowered; spikelets obovate, obtuse, 1.5-1.8 mm. long; first glume small, about one-third as long as the spikelet, second and third glumes equal, pubescent with spreading hairs. *P. pubescens* A. Gray, not Lam. Meadows: Me.—N.C.—Calif.—Mont. Plain—Mont. Je-S.

8. *P. thermale* Bolander. Tufted perennial; stem 1-3 dm. high; leaf-blades lanceolate, 2-10 cm. long, 5-10 mm. wide, thick, finely and densely pubescent on both sides, or glabrate above; terminal panicle exserted, 2-4 cm. long; branches spreading, few-flowered; lateral panicles often included; spikelets obovoid; first glume rounded-ovate, about one-fourth as long as the spikelet; the second and third glumes pubescent. Around hot springs: Calif.—Nev.—Wyo. Mont. Mont—Submont. Au.

9. *P. perlongum* Nash. Tufted pubescent perennial; stems 2-4 dm. high, simple; sheaths hirsute with long ascending hairs, leaf-blades papillose-hispid

beneath, 2-3 mm wide, the upper usually 8-14 cm. long; panicle much exserted, 4-6 cm. long, its branches nearly erect; spikelets about 3-25 mm. long and 1.5-1.75 mm. wide; first empty glume ovate, one-third as long as the spikelet. Prairies and hills: Ind.—Okla.—(Black Hills) S.D. Plain—Submont. My-Jl.

10. *P. Wilcoxianum* Vasey. Cespitose perennial, tufted; stems 1-2.5 dm. high, sparingly pilose with long white hairs; sheaths papillose-pilose; leaf-blades 3.5-7.5 cm. long, less than 4 mm wide, pubescent with long hairs, panicle 3-4 cm. long, ovoid, flexuose; spikelets about 2.5 mm. long, ellipsoid; first glume ovate, about one-fourth as long as the spikelet; second and third glumes pubescent. Prairies: S.D.—Kans.—Ore. Plains. Je-Jl.

11. *P. Scribnerianum* Nash. Somewhat cespitose perennial; stem erect, 1.5-6 dm. high, simple or later dichotomously branched, sparingly hairy, sheaths strongly papillose-hirsute; leaf-blades 5-10 cm. long, 6-12 mm wide, glabrous and smooth above, scabrous and sparingly hairy beneath, primary panicle ovoid, 3.5-7.5 cm. long, the secondary ones much smaller and more or less included; spikelets obovoid, 3 mm. long; first glume ovate, one-fourth as long as the spikelet; second and third glumes glabrous or finely pubescent. *Panicum scoparium* S. Wats., not Lam. Meadows. Me.—Va.—Ariz.—Ore.—B.C. Plain—Submont. My-Jl.

12. *P. obtusum* H B K. Perennial, with a more or less tufted rootstock, producing creeping stolons; stem compressed, 2-8 dm. high, decumbent at the base, glabrous; leaf-blades 3-20 cm. long, 2-7 mm wide, involute towards the tip, glabrous or nearly so; panicle short-exserted, 3-12 cm. long; spikelets short-pedicelled, 3-4 mm. long, obovoid, glabrous; first glume nearly as long as the spikelet; second and third glumes subequal; third glume often enclosing a staminate flower. *Brachiaria obtusa* (H B K.) Nash. Sandy and gravelly soil. Mo.—Tex.—Ariz.—Colo.; Mex. Son.

11. *ECHINÓCHLOA* Beauv. BARNYARD GRASS, JUNGLE RICE

Coarse and often tall annuals. Inflorescence of several unilateral spikes or racemes. Spikelets 1- or 2-flowered, crowded in small clusters or racemes, in two rows on one side of the flat rachis. Empty glumes 3, membranous, lispid, the first much shorter than the spikelet, all awned or awn-pointed. Lemma chartaceous, glabrous and shining, indurate, acute or acuminate, enclosing a shorter palea. Styles distinct, stigmas plumose.

1. *E. Crus-galli* (L.) Beauv. Stem 4-12 dm. high, branched at the base, leaf-sheaths keeled; blades 1.5-4 dm. long, 6-10 mm wide, glabrous, smooth, panicle of 5-15 secund branches; spikelets ovate, crowded in 2-4 rows, about 4 mm. long, hispidulous, hispid on the nerves; first glume broadly ovate, nearly half as long as the rest; the third glume in the typical form usually with an awn 4-10 mm. long, but in the native form of the Rocky Mountain region (var. *mutica*) usually all merely cuspidate. *Panicum Crus-galli* L. Wet places, cultivated ground and waste places: N.S.—Fla.—Calif.—Wash.; Mex., W. Ind., Eurasia. Plain—Submont. Je-O.

12. *CHAETÓCHLOA* Scribn. FOXTAIL GRASS

Annuals or perennials. Inflorescence of dense terminal cylindric spike-like or narrowly thyrsoid panicles. Spikelets in a cluster of 1-several sterile barbed bristle-like persistent branches. Empty glumes 3, membranous, the first often very short and together with the larger second one empty, the third glume frequently longer than the second, empty, or rarely enclosing a palea and also sometimes a staminate flower, the lemma usually shorter than the spikelet, chartaceous, glabrous, shining, often transversely rugose, finally indurated, obtuse, enclosing a shorter palea. Styles distinct, elongated; stigmas plumose. [*Selaria* Beauv.]

Inflorescence with the spikelets racemously arranged, bristles 5-16 at the base of each spikelet, involucre, tawny-orange 1. *C. glauca*
Inflorescence with the spikelets in clusters on the branches, bristles 1-3 at the base of each spikelet, not involucre.

Second glume of the spikelet as long as the lemma, or very nearly so, annuals

Panicle usually 1 cm. thick or less, bristles commonly green, spikelets about 2 mm long 2. *C. viridis*

Panicle usually 1-3 cm thick, bristles usually purple, spikelets 2.5-3 mm. long.

Second glume manifestly shorter than the lemma. perennials

3. *C. italica*
4. *C. composita*.

1. *C. glauca* (L.) Scribn. Erect or ascending, glaucous annual; stem 3-12 dm. high, branching at the base, glabrous, compressed; leaf-blades 5-15 cm. long, 4-8 mm. wide, glabrous or with scattered long hairs at the base; spikelet broadly ovate, 3 mm. long, second glume one-half to two-thirds as long as the spikelet, ovate, acute; third glume equalling the lemma, which is broadly ovate, striate, transversely rugose. *Setaria glauca* Beauv. Waste places and cultivated ground. N.S.—Fla.—Tex.—Colo.—Sask.; naturalized from Eurasia. Plain—Submont. Je-S.

2. *C. viridis* (L.) Scribn. Erect glabrous annual; stem 2-9 dm. high, branched at the base, compressed, leaf-blades 5-25 cm. long, 4-10 mm. wide, long-acuminate, slightly scabrous on both sides; bristles slender, scabrous, 1-1.5 cm. long, green or rarely purplish; lemma elliptic, finely and faintly wrinkled below or only striate. *S. viridis* Beauv. Waste places and cultivated ground. Newf.—Fla.—Calif.—B.C.; Mex., naturalized from Eu. Plain—Submont. JI-S.

3. *C. italica* (L.) Scribn. Stout, erect, somewhat glaucous annual; stem simple or branched at the base, 5-20 dm. high, glabrous; nodes bearded; leaf-blades lanceolate, 2-4 dm. long, 1.5-3 cm. wide, scabrous on both sides; bristles green or purplish, 3-10 cm. long, scabrous; lemma smooth or faintly transversely rugose, striate. *S. italica* Beauv. Waste places and fields; escaped from cultivation. Que.—Fla.—Tex.—Colo.—S.D.; native of Eurasia. JI-S.

4. *C. composita* (H.B.K.) Scribn. Pale, glaucous perennial; stem geniculate and branched at the base, subcompressed, scabrous or pubescent especially below the nodes; blades linear, plane, 1-2.5 dm. long, 2-5 mm. wide, glaucous, scabrous on both sides; panicle pale-green, loose, interrupted below; bristles usually single below each spikelet, flexuose, 5-15 mm. long, scabrous, spikelets narrowly ovate, 2-3 mm. long, lemma striate, smooth, obscurely transversely wrinkled below. *S. composita* H.B.K. Hills, plains, and cañons: Tex.—Colo.—Ariz.; Mex., and S. Am. Son. Je-O.

13. CÉNCHRUS L. BUR-GRASS, SANDBUR, SANDSPUR

Annuals or perennials. Spikes terminal. Spikelets 2-6, in an ovate or globose involucre, consisting of two thick hard valves, which are exteriorly armed with stout spines at the base, the involucre articulated to the rachis and readily deciduous, carrying the persistent spikelets with them. The first and second glumes empty, the first small or minute, the third equalling or longer than the second, enclosing a palet and also sometimes a staminate flower, the lemma chartaceous, firmer, enclosing a palet of similar texture and a perfect flower. Stamens 3. Styles often connate at the very base, stigmas plumose.

1. *C. carolinianus* Walt. Erect or decumbent annual; stem 2-9 dm. long, branching; leaf-sheaths usually loose, compressed, smooth; blades 6-12 cm. long, 4-8 mm. wide, smooth or rough; spikes 3-6 cm. long, sometimes partly included; involucre 6-20, enclosing each 2 spikelets, 3-5 mm. broad, pubescent; spines 3-4 mm. long; spikelets 6-7 mm. long, usually exerted beyond the involucre. *C. tribuloides* Auth., not L. Sandy banks and waste places, sometimes becoming a noxious weed. Me.—Fla.—Tex.—Colo.—S.D.; Mex., C. Am., and W. Ind. Plain—Son. Mr-N.

14. HOMALOCÉNCHRUS Mieg. RICE CUT-GRASS.

Perennials. Panicles usually open, rarely contracted, terminal, the branches slender. Spikelets often with a cartilaginous ring at the base, articulated below the scales, compressed, 1-flowered. Glumes 2, compressed-keeled, somewhat rigid, awnless, the first one usually ciliate on the keel, broader than the second, which encloses a perfect flower but no palet. Stamens 1-6. Styles short or slender, distinct; stigmas plumose with branched hairs. [*Leersia* Sw., not Hedw.]

1. *H. oryzoides* (L.) Poll. Stem 3-15 dm. high, often rooting at the nodes; leaf-blades 6-25 cm. long, 4-13 mm. wide, very rough; terminal panicle 1-2 dm.

long, at last exerted; lateral ones often included at the base, spikelets 4-5 mm. long, about 1.5 mm. wide, elliptic; outer glumes hispid on the keel and margins, hispidulous on the sides; stamens 3. *Leersia oryzoides* (L.) Sw. In swamps: N.S.—Fla.—Tex.—Colo.—Sask.; also Eu. *Plain—Submont.* Au—O.

15. *PHALARIS* L. CANARY-GRASS.

Annuals or perennials. Panicles terminal, cylindric and spike-like, capitate, or densely thyrsoidal and somewhat interrupted. Spikelets articulated above the empty glumes, compressed, 1-flowered, crowded. Empty glumes 4, the lower 2 persistent, larger than the rest, thin-paleaceous, compressed-keeled, the keel usually more or less winged, sometimes wingless, awnless; third and fourth glumes shorter, very thin and narrowly lanceolate, sometimes reduced to bristles, or rarely one of them wanting; lemma chartaceous, at length indurated, awnless, sometimes pointed, obscurely 3-5-nerved, the midnerve sometimes obsolete, enclosing a faintly 2-nerved palet. Styles distinct; stigmas plumose.

Outer glumes not winged. Inflorescence a narrow panicle 1 *P. arundinacea*.

Outer glumes winged. Inflorescence a spike or spike-like panicle

Spikelets narrow, third and fourth glumes much reduced, blades subulate-linear, 2 *P. caroliniana*.

hairy.

Spikelets broad; third and fourth glumes thin, membranous, blades lanceolate, 3. *P. canariensis*

glabrous, rarely sparingly hairy.

1. *P. arundinacea* L. Glabrous perennial, with a horizontal rootstock; stem erect, 6-15 dm. high; leaf-blades 1-2.5 dm. long, 6-16 mm. wide; panicle 7-20 cm. long, dense, 1-2 cm. thick; spikelets 5-6 mm. long; outer glumes 3-nerved; third and fourths glumes less than half as long as the lemma, which is pubescent with long appressed hairs. Wet places. N.S.—N.J.—Nev.—B.C.; Eurasia. *Plain—Mont.* Je—Au.

2. *P. caroliniana* Walt. Glabrous annual; stem 3-10 dm. high, leaf-blades 5-15 cm. long, 4-10 mm. wide; panicle oblong, 2.5-10 cm. long, 1-1.5 cm. thick; spikelets 5 mm. long; outer glumes 3-nerved; third and fourth glumes less than half as long as the lemma, which is acuminate and with long appressed hairs. Wet ground: Fla.—S.C.—Mo.—Colo.—Calif.; Mex. *Son.—Aust.* My—Au.

3. *P. canariensis* L. Glabrous annual; stem 3-9 dm. high, branched at the base; leaf-blades 5-30 cm. long, 4-12 mm. wide, strongly scabrous; panicles oblong or ovoid, 1-4 cm. long; spikelets 6-8 mm. long; outer glumes whitish with green nerves; third and fourth glumes broadly lanceolate, about half as long as the pubescent lemma. Waste places. N.S.—Va.—Colo.—S.D.; also Calif.—Ore., naturalized from Europe and Africa. *Plain—Submont.* Je—Jl

16. *TORRËSIA* R. & P. SWEET GRASS, HOLY GRASS.

Sweet-scented perennials with rootstocks. Panicles open or contracted. Spikelets 3-flowered, the terminal flower perfect, the others staminate. Empty glumes nearly equal, acute, glabrous. Lemma 2-toothed or 2-lobed, with or without an awn. Stamens in the staminate flowers 3, in the perfect flowers 2. Styles distinct; stigmas plumose. [*Hierochloa* Gmel. *Savastana* Schrank.]

1. *T. odorata* (L.) Hitchc. Perennial with a creeping rootstock; stem 3-6 dm. high, smooth; lower leaf-blades elongated, 1-2 dm. long, 2-6 mm. wide, the upper ones 1-5 cm. long; panicle 5-10 cm. long, its branches spreading or reflexed; spikelets yellowish brown or purplish, 4-6 mm. long; first and second glumes acute; third and fourth glumes villous and strongly ciliate, awn-pointed. *H. odorata* (L.) Wahl. *H. borealis* R. & S. *Savastana odorata* Scribn. Moist places and among bushes. Lab.—N.J.—Neb.—Colo.—Ariz.—Alaska; Eurasia. *Submont.—Alp.* Je—Jl.

17. *ARISTIDA* L. POVERTY GRASS, WIRE-GRASS.

Tufted perennials, with narrow leaves. Inflorescence paniculate or racemose. Spikelets 1-flowered, narrow. Empty glumes 2, membranous, persistent, keeled, awnless, usually longer than the lemma. The latter firm, narrow,

rigid, strongly convolute, with a prominent callus at the base, 3-awned at the apex; the central awn often bent and twisted, the lateral ones shorter and spreading or ascending. Styles distinct; stigmas plumose.

Awns neither twisted nor bent

Panicle narrow, branches erect or ascending.

First glume much shorter than the second.

Spikelets not crowded, usually 1-3, on branches naked at the base; awn over

2 cm. long, perennials

Second glume of the spikelets 2 cm. long or more, 1.5-2 times as long as the lemma

1. *A. longiseta*.

Second glume of the spikelets 1.5 cm. long or less, scarcely exceeding the lemma

2. *A. Fendleriana*.

Spikelets crowded, 4-6 on the short branches, spikelet-bearing to near the base, awn less than 2 cm. long; annuals.

Stem 3-6 dm. high, first glume 7-8 mm. long, middle awn 10-16 mm. long, leaf-blades usually flat.

3. *A. fasciculata*

Stem 1-3 dm. high, first glume 4-6 mm. long; middle awn 6-8 mm. long; leaf-blades strongly involute.

4. *A. bromoides*.

First glume nearly equalling the second; perennials with a dense panicle

7. *A. arizonica*.

Panicle open; branches 3-forked, divergent.

5. *A. Humboldtiana*.

Middle awn twisted and divaricately bent near the base

6. *A. Curtissii*.

1. ***A. longiseta*** Steud. Densely tufted glaucous glabrous perennial; stem 1-4 dm. high, sheaths shorter than the internodes; leaf-blades strongly involute, 2-11 cm. long; spikelets purplish; first empty glume shorter than the lemma; lemma 12-16 mm. long; awns 6-11 cm. long. Sandy soil: Ill.—Tex.—Ariz.—Wash.; Mex. *Plain—Submont.* My—Au.

2. ***A. Fendleriana*** Steud. Densely tufted glabrous perennial; stem 1.5-3 dm. high, erect; sheaths smooth, confined to the base of the stem; leaf-blades involute, often curved; panicle 7-10 cm. long, strict; spikelets 12-15 mm. long; lemma 9-12 mm. long; central awn 2-3.5 cm. long; lateral awns a little shorter. *A. purpurea* Coult., not Nutt. *A. longiseta Fendleriana* Merrill. Dry soil. Tex.—Mont.—Calif. *Son.—Plain—Submont.* Je—S.

3. ***A. fasciculata*** Torr. A tufted annual; stems 3-6 dm. high, branched; leaf-blades 5-15 cm. long, 2 mm. wide; panicle 5-17 cm. long, loose; branches at first strict, later more or less spreading; first glume 1-nerved, shorter than the second; lemma equalling or longer than the second, awns ascending, the lateral ones shorter than the middle one. (Mistaken for *A. oligantha* Michx.) Dry soil. Tex.—Kans.—s Utah—Ariz.—Mex. *Son.* My—S.

4. ***A. bromoides*** H B K. Low tufted annual; stem 1-3 dm. high; leaf-blades 2-7 cm. long, involute; panicle purple, 2-5 cm. long, dense; first glume one-nerved, shorter than the second, slightly longer than the lemma; awns ascending, the lateral ones 6-8 mm. long. Arid regions. Tex.—Colo.—Utah—Calif., Mex. *Son.* Ap—N.

5. ***A. Humboldtiana*** Trin. & Rup. Tufted perennial; stem 3-9 dm. high, branched; sheaths rough; blades of the stem-leaves 1.5-3 dm. long, 2-4 mm. wide; those of the sterile shoots longer and narrower; panicles 3-5 dm. long, open, empty glumes acuminate, awn-pointed, 9-13 mm. long; central awn 1.2-2 cm. long, erect, lateral ones somewhat shorter, ascending. *A. divaricata* H B K. Dry soil. Kans.—Colo.—Ariz.; Mex. *Son.* Jl—S.

6. ***A. Curtissii*** (A. Gray) Nash. Tufted; stem 2-5 dm. high, branching; leaf-blades 4-16 cm. long, 1-2 mm. wide; panicle spike-like, 5-9 cm. long, branches short, erect, first glume shorter than the second, which usually equals the lemma, 7-11 mm. long; middle awn 10-15 mm. long; lateral awns 1-2 mm. long, straight. Dry soil. Va.—w Neb.—Okla. *Aust.* S—O.

7. ***A. arizonica*** Vasey. Tufted perennial; stem 3-6 dm. high, rigid, glabrous, leaf-blades 1-2 dm. long, becoming involute; panicle 1-2.5 dm. long; branches 2 at each node, appressed, one longer, peduncled, the other shorter and sessile; glumes 12-14 mm. long, bidentate at the apex; awns of the lemma nearly equal, 1.5-2 cm. long, divergent when mature. Plains and hills: Tex.—s Colo.—Utah—Ariz. *Son.—Submont.*

3. *S. Tweedyi* Scribn. Tufted perennial; stem 6-9 dm. high, smooth; blades of the stem-leaves 1-1.5 dm. long, scabrous above; those of the shoots usually longer; first glumes 2-2.5 cm. long, 3-nerved; the second slightly longer, 5-nerved, long-attenuate; awn about 7-10 cm. long, twice bent, scabrous. *S. comata intermedia* Scribn. & Tweedy. Plains and mountains: Sask.—Colo.—Ariz.—Ida. *Plain—Submont* Je—Au.

4. *S. comata* Trin. & Rup. Tufted perennial; stem 3-6 dm. high, glabrous, sheaths usually longer than the internodes, the uppermost inflated, enclosing the base of the panicle; leaf-blades somewhat scabrous, involute; those of the basal innovations filiform, 1-3 dm. long, those of the stem 6-15 cm. long, broader; panicles 15-20 cm. long, loose, outer glumes 18-25 mm. long, glabrous; awn 1-2 dm. long, twice bent below. Prairies and sandy places. Alta.—Neb.—N.M.—Calif.—Alaska. *Plain—Submont*. Je—Au.

5. *S. Porteri* Rydb. Tufted perennial; stems slender, 3-4 dm. high; leaf-blades 4-10 cm. long, involute, filiform, branches of the panicle with 1-2 spikelets; empty glumes membranous, 5 mm. long, purplish, lemma hairy below, slightly shorter; callus short, acute; awn 12-15 mm. long, plumose, with a single bend *S. mongolica* Porter & Coulter, not Turcz. Mountains: Colo.—Tex. *Mont*.

6. *S. Richardsonii* Link. Tufted perennial; stem slender, 5-10 dm. high; leaf-blades 4-10 cm. long, involute, filiform, 5-15 cm. long, smooth; panicle open, 7-12 cm. long, branches slender, with 1-3 spikelets, empty glumes purplish, 8-9 mm. long, broadly lanceolate, acute, lemma thinly pubescent; awn 12-20 mm. long, strigulose. Hillsides and open woods: Sask.—S.D.—Colo.—Alta. *Mont*. Jl—S.

7. *S. canadensis* Poir. Tufted perennial; stem 3-6 dm. high, smooth or somewhat scabrous; blades 5-12 cm. long, 1-2 mm. wide, scabrous; panicle 5-12 cm. long; outer glumes 4-5 mm. long, obtuse or acutish, glabrous, membranous, lemma silky-strigose; awn 8-10 mm. long, twisted but only slightly bent. *S. Macounii* Scribn. Sand hills and open woods: N.B.—Me.—Mich.—Sask. *Boreal* Jl.

8. *S. Lettermani* Vasey. Tufted perennial; stem 3-5 dm. high, slender, basal leaf-blades filiform, 1-1.5 dm. long, involute, glabrous; panicle 1-1.5 dm. long, branches mostly single, spikelet-bearing to near the base; empty glumes 6-7 mm. long, acuminate, awn-pointed, 3-nerved; awn 12-16 mm. long, once bent. Hills and plains: Ida.—Wyo.—Colo. *Submont*. Jl—Au.

9. *S. pinetorum* M. E. Jones. Tufted perennial; stem 2-3 dm. high, slender, glabrous; basal leaves with thick brown sheaths; blades filiform, involute, 5-10 cm. long, glabrous; panicle narrow, 1-1.5 dm. long, barely exerted; branches appressed; empty glumes purple-tinged, 7-8 mm. long, the first 3-nerved, the second 1-nerved, lemma about 5 mm. long, hairy throughout but more densely so at the apex; awn 12-20 mm. long, glabrous, twice bent. Open pinelands: Utah. *Mont* Au—S.

10. *S. Scribneri* Vasey. Tufted perennial; stem erect, strict, 4-7 dm. high, glabrous; sheaths close, smooth or slightly scabrous, leaf-blades 1-3 dm. long, usually flat, scabrous above, inflorescence 1-2 dm. long; first glume 12-14 mm. long, linear-lanceolate, acuminate, 3-nerved, the second about 10 mm. long; awn 1.5-2 cm. long. Dry hills: N.M.—Colo.—Utah—Ariz. *Son.—Mont* Jl—Au.

11. *S. viridula* Trin. Tufted perennial; stem smooth, 3-6 dm. high; leaf-blades involute, smooth or scabrous above, the lower 1-2 dm. long; stem-leaves 6-15 cm. long; outer glumes 7-9 mm. long, prominently 3-nerved, awn-pointed; lemma 5-6 mm. long, strigose; awn 2-2.5 cm. long, twice bent, glabrous or somewhat scabrous. Plains and prairies: Sask.—Kans.—Utah—Mont. *Plain—Submont*. Jl—Au.

12. *S. columbiana* Macoun. Tufted perennial; stem very slender, 3-5 dm. high; basal leaf-blades 1-2 dm. long; stem-leaves much shorter; empty glumes 7-9 mm. long, awn-pointed; lemma silky-strigose, about 6 mm. long; awn about 3 cm. long, twice bent, minutely strigulose. Hills and mountains: B.C.—Wyo. *Submont.—Mont*. Jl—Au.

13. *S. arida* M. E. Jones. Densely tufted perennial, stem erect, about 3 dm. high, smooth; blades 3-10 cm. long, filiform, involute, smooth; panicle narrow, 1-1.5 dm. long; lower branches in 5's, short; empty glumes lanceolate, acuminate, 8-10 mm. long; lemma 4 mm. long, glabrous above, short-pubescent below; awn 3-5 cm. long, slender, glabrous, only slightly bent. Dry hillsides: Utah—Colo. *Son.*—*Submont.* My—Je.

14. *S. Nelsonii* Scribn. Tufted perennial; stem stout, 7-9 dm. high, smooth; leaf-blades 1-3 dm. long, those of the innovations narrow and involute; stem-leaves 2-4 mm. wide and often flat; panicle 1.5-3 cm. long; first glume 9-10 mm. long, 3-nerved; second glume slightly longer, 5-nerved; lemma 7 mm. long, almost cylindric, silky-strigose; awn about 3.5 cm. long, minutely scabrous. Plains, hills, and cañons: Sask.—Colo.—Utah—Ida.—Alta. *Submont.*—*Mont.* Jl—Au.

15. *S. minor* (Vasey) Scribn. Densely tufted perennial; stem smooth, 3-6 dm. high; leaf-blades 1-3 dm. long, 2-3 mm. wide, usually strongly involute, scabrous on the margin; panicle purplish, 5-12 cm. long; empty glumes faintly 3-nerved near the base; lemma thinly strigose; awn minutely scabrous, about 2 cm. long. Mountain sides: Mont.—N.M.—Utah. *Submont.*—*Subalp.*

16. *S. Vaseyi* Scribn. Densely tufted perennial; stem 1-2 m. high, stout, often 1 cm. thick below; sheaths usually broad and loose, hairy at the junction of the blades; blades of stem-leaves usually flat, 3-6 dm. long, scabrous, those of the innovations narrower, involute; panicle 2.5-4 dm. long, dense; empty glumes nearly equal, lanceolate, about 1 cm. long, acuminate, lemma about 8 mm. long, silky-strigose; awn 2.5-3 cm. long, minutely scabrous. Hills and mountain sides: Tex.—Colo.—Ida.; Mex. *Son.*—*Mont.* My—Au.

17. *S. Williamsii* Scribn. Tufted perennial, stem 7-9 dm. high; leaf-blades 1.5-3 dm. long, pubescent on the back, scabrous above; empty glumes lanceolate, long-acuminate, 6-8 mm. long; lemma about 6 mm. long, finely strigose; awn about 2.5 cm. long, minutely scabrous. Dry soil: Wyo.—Mont. *Submont.*—*Mont.* Jl—Au.

18. *S. Elmeri* Piper & Brodie. Tufted perennial; stem 3-6 dm. high, glabrous or somewhat pubescent, lower leaf-blades slender and involute, those of the stem broader, often flat, 5-15 cm. long; inflorescence 1-2 dm. long; empty glumes 10-12 mm. long, acuminate, hyaline, 3-nerved; lemma about 7 mm. long, finely strigose; awn 3-3.5 cm. long, sub-plumose up to the second bend. Meadows and fields: Wash.—Wyo.—s Calif. *Submont.* Je—Au.

19. *S. oregonensis* Scribn. Tufted perennial; stem 3-5 dm. high, glabrous; uppermost sheath loose, enclosing the base of the panicle; basal leaf-blades involute-filiform, 1-2 dm. long; upper stem-leaves 4-6 cm. long; panicle 8-16 cm. long, narrow, outer glumes narrowly lanceolate, acuminate, 3-nerved, 10 mm. long; lemma 7-8 mm. long, thinly pubescent; awn 2.5-3.5 cm. long, sub-plumose on the lower half. *S. stricta* Vasey, not Lam. *S. occidentalis* Piper, not Thurb. Ridges and bench-lands: Wash.—Wyo.—Calif. *Submont.* Jl—S.

20. *S. Thurberiana* Piper. Tufted perennial; stem 3-10 dm. high, sometimes tinged with purple, scabrous or puberulent, often pubescent at the nodes; sheaths close, usually puberulent; blades 1-2 dm. long, or the upper shorter, involute; panicle 7-15 cm. long, with the base often included; first glume 1 cm. long, 5-nerved, the second shorter, 3-nerved; lemma 6-7 mm. long, strigose; awn 3-4 cm. long, plumose below the bend. Dry plains: Wash.—Ida.—Nev.—Calif. *Submont.*—*Son.* Je—Jl.

21. *S. speciosa* Trin. & Rup. Tufted perennial; stem 3-6 dm. high; lower sheaths more or less pubescent, the upper glabrous and loose; lower leaf-blades 1-3 dm. long, usually involute; panicle 1.5-2 dm. long, included below; empty glumes hyaline, long-acuminate; lemma 10-12 mm. long, pubescent; awn 4-5 cm. long, long-plumose below, glabrous above, with a single bend. Hills: Calif.—Utah—Ariz.; Mex. *Son.* My—Jl.

19. *ORYZOPSIS* Michx. MOUNTAIN RICE.

Tufted perennials. Inflorescence paniculate with racemose branches. Spikelets 1-flowered, broad; flowers perfect. Empty glumes subequal, acute. Lemma broad, indurate, convolute, with a short and obtuse callus at the base, ending in a terminal, early deciduous, mostly straight awn. Styles distinct: stigmas plumose. Grain oblong, free.

Lemma glabrous, or pubescent with short appressed hairs

Spikelets, exclusive of the awn, 2.5–5 mm. long, leaves slender and involute

Awn less than 2 mm. long, much shorter than the glume, outer glumes 3–4 mm. long

1. *O. pungens*

Awn 4–8 mm. long, much longer than the glume

Inflorescence very narrow, with short erect branches, outer glumes 3–5 mm. long

2. *O. exigua*

Inflorescence at length open, with long spreading or reflexed branches, outer glume about 2.5 mm. long

3. *O. micrantha*

Spikelets, exclusive of the awn, 6–8 mm. long, leaves broad and usually flat

4. *O. asperifolia*

Lemma with long loose hairs

Inflorescence open, plant 3–6 dm. high

5. *O. Bloomeri*

Inflorescence narrow and spike-like, plant 1–3 dm. high

6. *O. Webberi*

1. *O. pungens* (Torr.) Hitchc. Tufted perennial, stem glabrous, 1.5–3 dm. tall, simple; sheaths shorter than the internodes, smooth; leaf-blades smooth or scabrous, the lower 1–2 dm. long, the upper 3–10 cm. long; panicle 3–6 cm. long; branches erect or ascending; spikelets 3–4 mm. long; empty glumes glabrous, whitish, faintly nerved, acute; lemma strigose, ellipsoid. *O. canadensis* Torr. *O. juncea* B.S.P. Dry rocky places: Que.—Pa.—S.D.—B.C. Boreal—Mont. My.—Je.

2. *O. exigua* Thurb. Densely tufted perennial; stem 1.5–4 dm. high; panicle 2–6 cm. long; empty glumes 4–5 mm. long, acute or abruptly acuminate, the first 1-nerved, the second 3-nerved, lemma sparingly strigose; awn slightly twisted below, 4–6 mm. long. Hills and mountain sides: Mont.—Colo.—Ore.—Wash. Mont.—Subalp. Je.—Au.

3. *O. micrantha* (Trin. & Rup.) Thurb. Somewhat tufted perennial; stem glabrous, 3–7 dm. tall, slender; leaf-blades erect, scabrous, less than 1 mm. wide, usually involute, the lower 2–3 dm. long; panicle 8–15 cm. long; empty glumes 2–2.5 mm. long, glabrous, acute; lemma a little shorter, glabrous, shining, awn 6–8 mm. long. Hillsides and among bushes: Sask.—Neb.—N.M.—Ariz.—Mont. Plain—Mont. Je.—Au.

4. *O. asperifolia* Michx. Tufted perennial; stem 3–5 dm. high, simple, usually scabrous; leaf-blades erect, scabrous, 1–4 dm. long, 4–10 mm. wide; panicle 5–8 cm. long, narrow, spike-like; empty glumes glabrous, 6–8 mm. long, many-nerved, apiculate; lemma whitish, sparingly hairy, except a ring of dense hairs at the base; awn 7–10 mm. long. Woods: N.S.—Pa.—Minn.—N.M.—B.C. Mont. My.—Je.

5. *O. Bloomeri* (Bolander) Ricker. Tufted perennial; stem 3–6 dm. high, glabrous; leaf-blades involute, 1–2 dm. long; panicle 1–2 dm. long, open but rather narrow; empty glumes dull green, tinged with purple, 6–7 mm. long, acuminate; lemma 5 mm. long, clothed with spreading or ascending long white hairs, awn twisted and bent, about 2 cm. long. *O. caduca* (Scribn.) Bcal. *Eriocoma caduca* Rydb. Hills: Mont.—Colo.—Calif. Submont. Jl.

6. *O. Webberi* (Thurb.) Benth. Densely tufted perennial; stem 1–3 dm. high, wiry; lower sheaths crowded, glabrous; leaf-blades very narrow, stiff, involute, the lower 5–10 cm. long, glaucous; panicle dense and spike-like, 2–10 cm. long; branches short and erect; empty glumes 8 mm. long, acuminate, often purple-tinged; lemma 6 mm. long, copiously long-hairy, awn 4 mm. long, very slender, soon caducous. Arid regions: Calif.—Colo. Son. My.—Jl.

20. *ERIOCOMA* Nutt. INDIAN MILLET, WILD RICE.

Densely tufted perennials with involute leaves. Inflorescence cymosely and divaricately branched. Spikelets 1-flowered; flower perfect. Empty glumes 2, membranous, somewhat scarious, acuminate. Lemma rather broad, indurate

and convolute, densely pubescent with silky hairs, with an obtuse callus at the base, and a deciduous straight awn at the apex. Styles distinct; stigmas plumose. Grain oblong, free, enclosed in the lemma

1. *E. hymenoides* (R & S.) Rydb. Stem 3-6 dm. high, erect, rigid, smooth; leaf-blades 1.5-3 dm. long, involute, less than 2 mm. wide; panicle 1.5-3 dm. long; branches spreading, flexuose; lower glumes 6-8 mm. long, long-acuminate, with somewhat spreading tips; lemma 4 mm. long, broadly ellipsoid, densely pubescent with white hairs. *Eriocoma cuspidata* Nutt. Bad lands and sandy places: Sask.—Kans.—Tex.—Calif.—Wash.; Mex. Plain—Mont. My-Jl

21. MUHLENBERGIA Schreb

Perennials or annuals. Inflorescence a narrow contracted or open diffuse panicle. Spikelets 1-flowered; flower perfect. Empty glumes 2, membranous or hyaline, persistent, keeled, acute to short-awned, the second sometimes 3-toothed. Lemma somewhat rigid, enclosing the palea, entire or 2-toothed at the apex, obtuse, acute, or awned. Stamens usually 3. Styles distinct, stigmas plumose

Panicle contracted, narrow, spike-like, the short branches rarely spreading

Empty glumes awl-shaped, leafy and branched plants, with long rootstocks covered by imbricated scales

Lemma not awned, basal hairs not equalling the lemma.

Empty glumes about equalling the lemma in length, sharp-pointed, about 3 mm. long. 1 *M. mexicana*

Empty glumes exceeding the lemma, generally twice as long, awned, about 5 mm. long. 2 *M. racemosa*

Lemma distinctly awned, basal hairs equalling the lemma 3. *M. comata*.

Empty glumes lanceolate to ovate

Second glume not toothed or slightly so

Lemma awnless or rarely very short-awned

Empty glumes more than half as long as the lemma

Plant 1.5-7 dm. high, sheaths close, empty glumes acuminate, lanceolate

Lemma scabrous, green or dark.

Panicle dense, obtuse, 5-10 mm. wide 4 *M. Wrightii*

Panicle slender and lax, attenuate at the apex, less than 5 mm. wide 5 *M. cuspidata*

Lemma more or less purplish, sparingly long-hairy

6 *M. Thurberi*

Plant less than 1.2 dm. high, sheaths loose, lower leaves lanceolate, short, squarrose, empty glumes ovate, acute 7 *M. squarrosa*

Empty glumes less than half as long as the lemma, obtuse or abruptly acute

Spikelets (excluding the awn if present) 1.5 mm. or more long

Plant with a strong perennial, scaly rootstock

Empty glumes less than one-fourth as long as the lemma, stem diffuse, decumbent or creeping, plant not tufted

8 *M. Schrebleri*

Empty glumes one-third as long as the lemma or longer, stem erect or decumbent at the base only, plant tufted

9 *M. Richardsonii*

Plant annual, rootstock, if any, very slender

Lemma merely awn-pointed, decidedly purplish, plant 1-2 dm. high

Spikelets 2 mm. long or more, inflorescence short and rather dense, stem 0.5-1 mm. thick 10 *M. simplex*

Spikelets about 1.5 mm. long, inflorescence slender and lax, stem very slender, filiform 11 *M. filiformis*

Lemma with a distinct awn 0.5-1 mm. long, greenish, plant 4-6 cm. high 12 *M. aristata*

Spikelets about 1 mm. long, plant less than 4 cm. high, annual 13 *M. Wolfii*

Lemma long-awned

Leaf-blades erect, glabrous or minutely scabrous; stem and sheaths glabrous

Lemma glabrous, rootstock short and woody 14 *M. pauciflora*

Lemma pubescent on the lower half, rootstock slender, creeping, branched 15 *M. polycaulis*

Leaf-blades spreading, as well as the stem below the nodes and the sheaths scabrous-puberulent, lemma pubescent on the lower half, rootstock creeping 16 *M. curtisfolia*

Second glume sharply 3-5-toothed, flowering glume long-awned, awn at least one-half as long as the glume

Stem 3-6 dm. high, leafy, panicle 7-12 cm. long, awn 8-15 mm. long

17 *M. gracilis*.

Stem 1-3 dm. high, almost naked above, panicle 3-7 cm. long, awn 1-4 mm. long.
Spikelets 3-4 mm. long, awn 2-4 mm., leaf-blades usually stiff.

18 *M. subalpina*.

Spikelets about 2 mm. long; awn 1-2 mm., leaf-blades filiform.

19 *M. filiculmis*.

Panicle open, its branches long and spreading.

Plants densely caespitose, branched only at the base.

Secondary branches of the panicle single, basal leaves short, strongly recurved.

20 *M. gracillima*.

Secondary branches of the panicle fascicled, basal leaves not recurved.

21 *M. pungens*.

Plants diffusely branched, prostrate.

22 *M. Porteri*.

1. *M. mexicana* (L.) Trin. Perennial; stem decumbent, prostrate, or erect, smooth, branched and very leafy; leaf-blades scabrous, 4-15 cm. long, 2-6 mm. wide; panicle 5-15 cm. long; spikelets 2.5-3 mm. long; empty glumes somewhat unequal, scabrous on the keel. Wet meadows and swamps. N B—N C—Tex—Colo.—Wyo—N.D. *Plain—Submont.* Je-S.

2. *M. racemosa* (Michx.) B.S.P. Perennial; stem erect, 3-10 dm. high, branched, smooth; leaf-blades 5-12 cm. long, 2-6 mm. wide, scabrous; panicle 5-10 cm. long, dense, usually interrupted; branches 1-2.5 cm. long, erect; spikelets much crowded, lemma one-half to two-thirds as long as the empty glumes, acuminate to awn-pointed. *M. glomerata* Torr. Wet places. Newf.—N.J.—Mo.—N.M.—Utah—B.C. *Plain—Mont.* Jl-S.

3. *M. comata* (Thurb.) Benth. Perennial; stem 3-7 dm. high, erect, smooth; leaf-blades 5-12 cm. long, erect, flat, scabrous, panicle often tinged with purple, 5-10 cm. long, dense, 1-1.5 cm. thick; empty glumes equal or the second a little longer, 2.5-3 mm. long; lemma a little shorter; awn 6-10 mm. long. Prairies and river valleys: Mont.—Colo.—Calif.—Wash. *Submont.—Mont.* Jl-S.

4. *M. Wrightii* Vasey. Somewhat tufted perennial, with short rootstock; stem erect or decumbent at the base, 3-7 dm. high, somewhat compressed; leaf-blades 6-15 cm. long, scabrous above, about 2 mm. wide; panicle cylindric, more or less interrupted; outer glumes nearly equal, 2 mm. long, thin, ovate or lanceolate, awn-pointed; lemma a little longer, tipped with a short awn. Mountains: N.M.—Colo.—Ariz.; Mex. *Submont.* Jl-S.

5. *M. cuspidata* (Torr.) Rydb. Somewhat tufted perennial, occasionally with elongated scaly rootstocks, stem slender, 3-6 dm. high, glabrous; leaf-blades 2.5-10 cm. long, less than 2 mm. wide, involute-setaceous at least when dry, panicle 4-12 cm. long; empty glumes about 2 mm. long, scabrous on the keel, flowering glume long-acuminate, about 3 mm. long. *Sporobolus brevipilus* (Nutt.) Scribn. Dry soil: Man.—Mo.—Colo.—Alta. *Plain—Submont.* Jl-S.

6. *M. Thurberi* (Scribn.) Rydb. Tufted perennial with a scaly rootstock; stems 1.5-3 dm. high, leaf-blades 1-3 cm. long, strongly involute, the lower more or less spreading; panicle 2-5 cm. long, 2-3 mm. thick; empty glumes equal, 1-nerved, lanceolate, 3 mm. long, usually purplish; lemma lanceolate, cuspidate, 3-nerved, 4-4.5 mm. long. *Sporobolus filiculmis* Vasey, not Dewey. *S. Thurberi* Scribn. Dry places and cañons. Tex—Colo.—N.M. *Son.—Submont.* Jl-S.

7. *M. squarrosa* (Trin.) Rydb. Tufted perennial; stems less than 1 dm. high, decumbent at the base, glabrous and almost smooth; leaf-blades scarcely 1 cm. long, panicle 1-2 cm. long, narrow and rather few-flowered; empty glumes 1-1.5 mm. long, 1-nerved, straw-colored; lemma lanceolate, acute, 1.5-2 mm. long. *Sporobolus depauperatus* (Torr.) Scribn. Dry, sandy or alkali soil: Wash.—Mont.—Wyo.—Calif. *Son.—Submont.* Jl-Au.

8. *M. Schreberi* Gmel. Perennial, with a creeping, scaly rootstock; stem 3-9 dm. long; leaf-blades 3-9 cm. long, scabrous; panicle 5-20 cm. long, 2-5 mm. thick, lax; empty glumes small, the first often wanting; lemma without the awn about 2 mm. long, strongly scabrous; awn 1-4 mm. long. *M. diffusa* Willd. Dry hills and woods: Me.—Fla.—Tex.—w. Neb.—Minn. *Boreal—Plain.* Au-S.

9. *M. Richardsonis* (Trin.) Rydb. More or less tufted perennial, with a strong rootstock; stem 1-4.5 dm. high, erect or decumbent at the base, slender, smooth; leaves 1-5 cm. long, usually involute; panicle 1-7 cm. long, 2-4 mm.

thick, empty glumes ovate, obtuse, or abruptly acute, about 1 mm. long; lemma 2.5–3 mm. long, long-acuminate. *Vilfa Richardsonis* Trin. Prairies and meadows. Que.—Me.—N.M.—Calif.—B.C. Plain—Mont. Je-S.

10. *M. simplex* (Scribn.) Rydb. Cespitose leafy annual; stem 5–15 cm. high, smooth, with short lower internodes; leaf-blades 1–4 cm. long, 1–2 mm. broad, scabrous on the margins and nerves above; panicle 2–5 cm. long, 2–4 mm. thick; empty glumes less than 1 mm. long, ovate, obtuse or truncate; lemma 3-nerved, mucronate, scabrous above, 2–2.3 mm. long. *Sporobolus simplex* Scribn. Wet places: Neb.—N.M.—Mont. Plain—Mont. Au-S.

11. *M. filiformis* (Thurb.) Rydb. Cespitose annual; stem 7–30 cm. high, slender, filiform, glabrous; leaf-blades 1–2 cm. long, 0.5 mm. wide or less, usually flat, scabrous above; panicle long-exserted, narrow, lax, 2–10 cm. long, more than 2 mm. thick; empty glumes less than 1 mm. long, ovate, obtuse, 1-nerved, mucronate; lemma 2 mm. long, lanceolate, acuminate. *Vilfa depauperata filiformis* Thurb. *V. gracillima* Thurb. Wet places. Mont.—Colo.—Calif.—B.C. Submont.—Subalp. My-Au.

12. *M. aristata* Rydb. Cespitose annual; stems usually only 4–6 cm. high; leaf-blades 8–14 mm. long, and about 1 mm. wide; panicle few-flowered, very narrow, with short erect branches; empty glumes 1–1.25 mm. long, ovate, acutish or obtuse and somewhat erose at the apex; lemma about 2.5 mm. long, strongly veined. *Sporobolus aristatus* Rydb. Wet places: Utah—Wyo.—Colo. Submont. Jl-Au.

13. *M. Wolfii* (Vasey) Rydb. Cespitose annual; stem 2–5 cm. high, lower sheaths inflated, glabrous; leaf-blades rarely over 1 cm. long, strongly nerved, panicle spike-like, about 1 cm. long, scarcely 2 mm. thick, lax; empty glumes ovate, about 0.5 mm. long; lemma ovate, acute, about 1 mm. long. *Sporobolus Wolfii* Vasey. Wet places: Colo.—Ariz. Mont.—Subalp.

14. *M. pauciflora* Buckl. Perennial; stems tufted, wiry, erect, 3–5 dm. high, scabrous, leafy, leaf-blades narrow, involute, 5–15 cm. long, minutely scabrous; panicle 10–15 cm. long; spikelets nearly sessile; empty glumes subequal, lanceolate, usually awn-pointed, 2 mm. long; lemma 3-nerved, lanceolate, acuminate, 3–4 mm. long, scabrous on the keel; awn 8–12 mm. long. Rocky hills: Tex.—Colo.—Utah—Mex. Son. My-S.

15. *M. polycaulis* Scribn. Perennial, fasciculate-branched at the base; stems ascending or erect, leafy, glabrous or minutely scabrous; leaf-blades erect, 2–6 cm. long, 1–2 mm. wide, often involute; panicle 5–10 cm. long, narrow; rachis scabrous, triangular; pedicels scabrous, short; empty glumes subequal, broadly lanceolate, acute or awn-pointed; lemma broadly lanceolate; awn 1–2.5 cm. long. Dry ledges and in cañons: Tex.—se Utah—Mex. Son. Au-S.

16. *M. curtifolia* Scribn. Perennial, fasciculate-branched at the base; leaf-blades 1–2.5 cm. long, 2 mm. wide or less, pungent at the end; panicle narrow, 4–8 cm. long, branches erect; rachis triangular or compressed, scabrous; empty glumes lanceolate, acute, subequal, 2.5 mm. long, scabrous along the keel; lemma broadly lanceolate; awn scabrous, 1–3 mm. long. Cañons: s Utah. Son. Au.

17. *M. gracilis* (H.B.K.) Trin. Tufted perennial; stems 3–6 dm. high, erect; leaf-blades often convolute, 5–20 cm. long; panicle narrow but rather loose; branches erect, flowering to the base; empty glumes unequal, the first 2 mm. long, 1-nerved, acute; lemma without the awn about 4 mm. long, scabrous on the back, ciliate on the margins. *M. trifida* Woot. & Standl., not Hack. Mountains: Tex.—Colo.—Calif.; Mex. Son.—Mont. Je-S.

18. *M. subalpina* Vasey. Tufted perennial; stem erect, 1–3 dm. high; leaf-blades usually involute, 2–7 cm. long; panicle narrow, dense; branches erect, less than 1 cm. long; first empty glume about 2 mm. long, acute, 1-nerved, awn-pointed; lemma 3–3.5 mm. long. *M. gracilis brevistarata* Vasey. Dry ridges: Wyo.—N.M. Mont.—Submont. Jl-Au.

19. *M. filiculmis* Vasey. Tufted perennial; stem erect, filiform, 1–2.5 dm. high, leafy at the base; leaf-blades filiform, 2–4 cm. long, involute, panicle spike-

like, 2-5 cm. long; branches short, erect; first empty glume thin, ovate, acute, 1.5 mm long, the second slightly longer; lemma lanceolate, sparsely pubescent below, 2 mm. long. Mountains: Colo. *Mont.* Jl-Au.

20. *M. gracillima* Torr. Cespitose perennial; stems 1-4 dm. high, erect, or decumbent at the base; leaves mostly basal; leaf-blades involute-setaceous, somewhat scabrous; panicle 5-20 cm. long, open, empty glumes unequal, the first about 1.5 mm, the second 2 mm. long, awn-pointed; lemma 2.5-3 mm. long, scabrous, awn 2-4 mm. long. RING GRASS. Plains and foot-hills: Tex.—Kans —Colo —N.M. *Plain—Mont.* Jl-O.

21. *M. pungens* Thurb. Perennial, with a cespitose, creeping rootstock; stems decumbent at the base, 1.5-4 dm. high; leaf-blades 2.5-5 cm. long, involute, rigid, scabrous; panicle 7-15 cm. long, open, its branches 5-7 cm. long, outer glumes 2-2.5 mm long, purplish, scabrous; lemma 3-4 mm. long, scabrous; awn short. PURPLE HAIR-GRASS, BLOW-OUT GRASS. Sand hills and bad-lands: Tex. —Neb —Utah—Ariz. *Plain—Mont.* Jl-Au

22. *M. Porteri* Scribn. Cespitose perennial; stems geniculate, decumbent, branching; leaf-blades usually flat, 3-5 cm. long, about 6 mm. wide, acuminate, scabrous above; panicle 7-10 cm. long, about 5 cm. wide; empty glumes narrowly lanceolate, 2-2.5 mm long, purplish; lemma without the awn 3.5-4 mm. long, purple, pilose; awn 5-10 mm long. *M. texana* Thurb., not Buckley. MES-QUITE GRASS. Hills and plains: Tex.—Colo.—Calif.; Mex. *Son.* Au-O.

22. LYCÛRUS H.B.K. TEXAS TIMOTHY.

Cespitose perennials. Panicle dense, spike-like. Spikelets 1-flowered, usually in pairs. Empty glumes 2, often awned, 3-nerved. Lemma 3-nerved, awned. Palea smaller, 2-nerved and 2-keeled. Stamens 3. Styles distinct, short; stigmas plumose. Grain free, included in the lemma.

1. *L. phleoides* H.B.K. Tufted perennial; stems decumbent at the base, 2-5 dm. high, compressed; leaf-blades scabrous above, 4-7 cm. long, 3 mm. wide; spike cylindric, dense, 4-10 cm. long, 5-8 mm. thick; first glume 1.5 mm. long, with 2 awns, 2-3 mm long; second glume with an awn 4 mm long; lemma lance-elliptic, 3 mm long, pubescent on the back; awn 2-3 mm. long. Hills. Tex —Colo —Ariz; Mex. *Son.—Submont.* Au-O

23. PHLEUM L. TIMOTHY.

Annuals or perennials. Inflorescence a dense spike-like panicle. Spikelets 1-flowered, compressed; flower perfect. Empty glumes 2, persistent, compressed, keeled, oblique at the summit, awned. Lemma shorter, membranous, truncate, denticulate. Styles distinct, long; stigmas sub-plumose. Grain free.

Spikes usually elongated-cylindric; awns less than one-half the length of the outer glumes.

Spikes short, ovoid or oblong, awns about one-half the length of the outer glumes.

1 *P. pratense*.
2 *P. alpinum*.

P. pratense L. Short-lived perennial, with a bulbiform thickened base; stem erect, glabrous and smooth, 3-15 dm. high; sheaths often exceeding the internodes, the upper long and close; leaf-blades 7-20 cm. long, 4-6 mm. wide, usually somewhat scabrous; spike 3-20 cm long, 5-8 mm. thick; outer glumes 3-4 mm. long, ciliate on the keel; awns about 1 mm long. Meadows; native but also often escaped from cultivation: N S —Fla —Calif —B.C; Eurasia. *Plain—Subalp.* Je-O.

2. *P. alpinum* L. Short-lived perennial; stem 1-5 dm. high, erect or sometimes decumbent at the base, smooth; sheaths often shorter than the internodes, the upper usually inflated; leaf-blades scabrous above, 2-7 cm. long, 3-8 mm. wide; spike 1-5 cm. long, 6-12 mm. thick; outer glumes 3 mm. long, strongly ciliate on the keel; awns 1.5-2 mm. long. Wet places: Lab.—N H —S D.—N M.—Calif.—Alaska; Eurasia. *Mont.—Alp.* Je-S.

24. ALOPECÛRUS L. FOXTAIL.

Annuals or perennials. Inflorescence a cylindric dense spike-like panicle. Spikelets articulate under the empty glumes, 1-flowered, compressed; flower perfect. Empty glumes 2, acute, sometimes short-awned, more or less united at the base, compressed-keeled. Lemma hyaline, obtuse, with a dorsal awn or point, their margins usually more or less united at the base. Styles distinct or nearly so; stigmas long, sub-plumose.

Awn about twice as long as the lemma

Spikes 8–12 mm thick, empty glumes 3.5–4.5 mm long, abruptly acuminate

Spike about 5 mm thick, empty glumes about 3 mm long, obtuse 1 *A. occidentalis*.

Stem erect, 3–5 dm high, slightly if at all geniculate at the base, pale, ligules 2 *A. pallescens*

4–5 mm long, acutish

Stem decumbent, and geniculate at the base, 1–1.5 dm high, ligules 2 mm long, 3 *A. Macounii*.

obtuse

Awn scarcely exceeding the lemma

Stem erect, 1.5–5 dm high; spike cylindric, obtuse 4 *A. aristulatus*

Stem geniculate at the base, 1–5 cm high, spike oblong, acute 5. *A. caespitosus*.

1. ***A. occidentalis*** Scribn & Twedy. Perennial, with a rootstock; stem erect, 2–10 dm. high; leaf-blades 5–15 cm. long, 4–7 mm. wide, flat, scabrous on the veins above; spike 2–3 cm. long; empty glumes equalling or slightly exceeding the obtuse lemma, which is scabrous and ciliate near the tips; awn 6 mm long, twisted below, bent at the middle, attached near the base of the glume. Wet meadows: Alta.—Colo.—Utah—Ida. *Mont*—*Subalp.* Je—Au.

2. ***A. pallescens*** Piper. Somewhat tufted perennial, pale green; blades flat, 6–12 cm. long, 2–6 mm. wide, strongly scabrous above; spike exerted, pale, 2–7 cm. long; empty glumes strongly ciliate on the keel, obtuse, lemma as long as the empty glumes, obtuse; awn nearly basal, about 5 mm long. Wet meadows: Wash.—Mont—Ida. *Submont.* My—Je.

3. ***A. Macounii*** Vasey. Somewhat caespitose perennial; blades 1–5 cm. long; spike 1–3 cm. long, 5 mm. thick; empty glumes ciliate on the keel, smooth on the sides, obtuse; lemma slightly shorter, glabrous, ovate-oblong, obtuse, awn nearly basal, bent at the middle, 6–8 mm. long. *A. geniculatus caespitosus* Scribn. Rocky places: Sask.—B C. *Boreal*—*Mont.* My—Je.

4. ***A. aristulatus*** Michx. Somewhat tufted perennial, leaf-blades 5–15 cm. long, 3–4 mm. wide, scabrous, especially above; spike 3–8 cm. long, 4–6 mm. thick; outer glumes 2–2.5 mm. long, acutish; lemma somewhat shorter, obtuse, glabrous; awn inserted at or near the middle. *A. geniculatus* Am. auth., not L. *A. fulvus* Am. auth., not Smith. Wet meadows. Me.—Pa.—Calif.—Alaska *Plain*—*Subalp.* Je—S.

5. ***A. caespitosus*** Trin. Caespitose perennial; leaf-blades flat, less than 2 cm. long, 1 mm wide; spike 0.5–1.5 cm long, 3–4 mm. thick, acute; outer glumes 2 mm. long, acutish; lemma nearly as long, obtuse; awn inserted near the base [Perhaps a depauperate form of the preceding.] Wet places: Canadian Rockies —N. W. Coast.

25. PHÍPPSIA R. Br.

Tufted annuals. Inflorescence a narrow panicle. Spikelets 1-flowered; flowers perfect. Empty glumes 2, minute, or the first one wanting. Lemma thin-membranous, keeled. Palea shorter, 2-keeled. Stamens 1, rarely more. Styles short, distinct; stigmas short-plumose. Grain enclosed in the lemma and the palea, which splits and lets it drop.

1. ***P. algida*** (Solander) R. Br. Stems 2–10 cm. high, erect or ascending; sheaths short, loose; leaf-blades 1–2 cm long, 0.5–2 mm. wide, obtuse; panicle 0.5–3.5 cm. long, narrow; spikelets 1–1.5 mm. long; empty glumes minute or the first one wanting; lemma thin, 1-nerved, obtuse or truncate and somewhat erose. Arctic-alpine situations: Greenl.—Alaska; Colo.; arctic Eurasia. *Alp.* Jl—Au.

26. BLEPHARONEÛRON Nash.

Tufted perennials. Panicles open, loosely flowered. Spikelets 1-flowered. Empty glumes membranous, 1-nerved, smooth, the first shorter and narrower

than the second. Lemma 3-nerved, the nerves densely pilose with long silky hairs; midnerve usually excurrent into a short awn. Palea as long as the lemma, 2-nerved, densely pilose between the nerves. Stamens 3. Styles distinct; stigmas plumose.

1. **B. tricholepis** (Torr.) Nash. Stem often purplish, glabrous, 3-10 dm. high; leaf-blades involute, 5-15 cm. long; panicle oblong, open, 1-1.5 dm. long; spikelets 2.5-3 mm long; empty glumes oblong, obtuse, nearly equal. *Sporobolus tricholepis* Torr. Mountain valleys: Tex.—Colo.—Utah—Ariz; Mex. Submont—Subalp. Jl-N.

27. SPOROBOLUS R. Br. DROP-SEED, RUSH-GRASS.

Perennials or rarely annuals. Inflorescence a panicle, either open or narrow and spike-like. Spikelets usually 1-flowered; flowers perfect. Empty glumes 2, the first shorter than the second. Lemma usually longer than the second glume. Palea 2-nerved, often deeply 2-cleft, about equalling the lemma. Stamens 2 or 3. Styles short, distinct; stigmas plumose. Grain free from the lemma and readily dropping off.

Perennials

First glume one-half as long as the second or less; plants not with long, scaly rootstocks

Branches of the panicle verticillate.

1. *S. argutus*

Branches of the panicle scattered.

Spikelets about 2 mm long, first glume lanceolate.

Sheath naked or sparingly ciliate at the throat, empty glumes glabrous

Plant 3 dm. high or less, spikelets long-pedicelled, sheaths sparingly villous.

9. *S. texanus*.

Plant 5-10 dm. high, spikelets short-pedicelled, sheaths glabrous.

2. *S. airoides*

Sheath with a conspicuous tuft of hairs at the throat, empty glumes scabrous on the keel

Leaf-blades widely spreading, involute, sheath pubescent with long hairs, at least towards the base

3. *S. Nealleyi*.

Leaf-blades not widely spreading, sheaths glabrous, except the apex, and slightly on the margins

Panicle narrow and spike-like

4. *S. strictus*.

Panicle not spike-like

Panicle always exserted, oblong, comparatively narrow; its lower branches but little, if any, exceeding the upper ones

5. *S. flexuosus*.

Panicle usually more or less included in the sheath, its lower branches much exceeding the upper ones

6. *S. cryptandrus*

Spikelets 4-5 mm long, first glume subulate, usually awned

7. *S. heterolepis*

First glume almost equalling the second, plants with long, scaly rootstocks

8. *S. asperifolius*.

Annuals, empty glumes almost equal, ovate.

10. *S. confusus*.

1. **S. argutus** (Nees) Kunth. Tufted perennial; stem 1-4 dm. high, erect or decumbent at the base; leaf-blades 2.5-5 cm long, 2-4 mm. wide, often sparingly hairy at the base; panicle-branches 1-2.5 cm long; spikelets 1.5 mm. long. Plains. Tex—Kans—Colo—Mex; W. Ind, C. Am. and S. Am. Son Ap.-O.; in the tropics the year around.

2. **S. airoides** Torr. Densely tufted perennial; stem 5-10 dm. high, erect; leaf-blades sometimes sparingly hairy at the base, 1-3 mm wide, involute, 5-35 cm long; panicle 1-4 dm. long, its branches at length widely spreading; spikelets 1.5-2 mm long, glumes acute, glabrous. Dry plains and river valleys: Tex—Mo—Mont.—Calif. Plain—Submont Au-S.

3. **S. Nealleyi** Vasey. Tufted perennial; stems 3-4 dm high, rigid; leaf-blades 2.5-3.5 cm. long, rigid, light-green, spreading, involute; panicle open, branches ascending; spikelets 1.5 mm. long; lower empty glume lance-subulate; second glume and the lemma lanceolate and acute. Dry ground: Tex.—Colo. Son. Jl-S

4. **S. strictus** (Seribn) Merr. Tufted perennial; stem strict, 5-10 dm. high, glabrous; blades 5-20 cm long, 3-5 mm. broad, mostly flat, glabrous; panicle 1-2 dm long, the base included in the upper sheaths; flowers pale or green, shining; empty glumes lanceolate, 2-2.5 mm. long, acute, smooth. River bottoms. Tex.—Utah—Ariz. Son. Je-O.

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5. *S. flexuosus* (Thurb.) Rydb. Tufted perennial; stem 3-8 dm. high; leaf-blades 5-20 cm. long, 2-4 mm. wide, usually flat, somewhat scabrous above; inflorescence 2-4 dm. long; branches 3-6 cm. long, spreading or reflexed; spikelets about 2 mm. long, usually lead-colored; empty glumes lanceolate, somewhat scabrous. Sandy soil: Tex.—Nev.—Ariz.; Mex. Son. JI-S.

6. *S. cryptandrus* (Torr.) A. Gray. More or less tufted perennial; stem 4-10 dm. long, erect, glabrous; leaf-blades 7-15 cm. long, 2-4 mm. wide, flat, glabrous beneath, scabrous above; panicle 1.5-2.5 dm. long; spikelets lead-colored, 2-2.5 mm. long; glumes scabrous on the keel. Sandy soil: Mass.—Pa.—Ariz.—Wash.; Mex. Plain—Submont. Au-O.

7. *S. heterolepis* A. Gray. Tufted perennial; stem 3-10 dm. high, erect; leaf-blades involute, glabrous, with rough margins and midribs, 2-5 dm. long; panicle 7-25 cm. long, open, exserted; branches ascending; glumes smooth and glabrous, the first one subulate, 2-3 mm. long, the second lanceolate, 4-5 mm. long, awn-pointed; lemma obtuse or acute. Dry soil. Que.—Pa.—Tex.—S. D.—Sask. Plain—Submont. Au-S.

8. *S. asperifolius* (Nees & Meyen) Thurb. Perennial with a caespitose creeping rootstock; stem 1-5 dm. high, erect from a decumbent base; leaf-blades 2.5-10 cm. long, 2-3 mm. wide, flat, very scabrous above; panicles 7-20 cm. long, usually included at the base; branches usually spreading in age; spikelets 1.5 mm. long; glumes acute, glabrous, somewhat scabrous, lemma slightly exceeding them. Sandy or dry soil: Sask.—Mo.—Tex.—Calif.—B. C.; Mex. Plain—Submont. Je-S.

9. *S. texanus* Vasey. Tufted perennial, otherwise resembling *S. asperifolius*, stems rigid; leaf-blades 2.5-7.5 cm. long, scabrous above; panicle half the length of the plant, included in the sheath below; lower glume half as long as the second one, which is fully as long as the lemma. Plains. Tex.—Okla.—s Colo.—N. M. Son.

10. *S. confusus* (Fourn.) Vasey. Tufted annual; stem 1-3 dm. high, slender, branched below; sheath short, loose, glabrous; leaf-blades 1-4 cm. long, 0.5-1.5 mm. wide; panicle open, 3-20 cm. long; branches spreading; spikelets 1-1.5 mm. long; empty glumes shorter than the lemma, glabrous or pubescent, lemma pubescent. Meadows especially in sandy soil. Neb.—Tex.—Ariz.—Ida.; Mex. Son.—Submont. JI-S.

28. POLYPOGON Desf. BEARD-GRASS.

Annuals or rarely perennials. Inflorescence a dense, contracted, spike-like panicle. Spikelets articulate below the empty glumes, crowded, 1-flowered. Flowers perfect. Empty glumes about equal, each terminating in a slender awn. Lemma thin, emarginate or 2-toothed at the apex, awned or awn-pointed on the back. Stamens 1-3. Styles short, distinct; stigmas plumose.

1. *P. monspeliensis* (L.) Desf. Simple annual; stem 1-6 dm. high, erect or decumbent at the base; leaf-blades 4-15 cm. long, 3-6 mm. wide, scabrous; panicle 2-10 cm. long; empty glumes about 2 mm. long, bearing a more or less bent awn 4-6 mm. long; lemma shorter, erose-truncate, hyaline; awn 0.5 mm. long. Waste places: S. C.—N. H.—B. C.—Calif.; Mex.; naturalized from Eurasia. Plain—Submont. Ap—Au.

29. CINNA L. REED-GRASS.

Tall perennials with broad flat leaves. Inflorescence a large often nodding panicle. Spikelets numerous, 1-flowered, articulate under the empty glumes. Flowers perfect. Empty glumes 2, persistent, keeled, acute. Lemma similar, short-awned or awn-pointed just below the apex. Palea 1-nerved, keeled, the keel minutely ciliate. Stamen 1. Styles short, distinct; stigmas plumose.

1. *C. latifolia* (Trev.) Griseb. Stem 6-15 dm. high, erect; leaf-blades 1-2.5 dm. long, 4-12 mm. wide, scabrous; panicle 1-2.5 dm. long; spikelets 3 mm. long; empty glumes equal, acute, hispidulous on the keel; lemma somewhat shorter, 2-toothed at the apex; awn 1-2 mm. long. *Cinna pendula* Trin. Damp woods: Newf.—N. C.—Utah.—B. C. Submont.—Mont. JI-S.

30. AGRÓSTIS L. RED-TOP, BENT-GRASS, TICKLE-GRASS

Annuals or perennial, mostly tufted. Inflorescence paniculate. Spikelets numerous, small, 1-flowered, articulate above the empty glumes. Empty glumes 2, persistent, membranous, keeled, acute, awnless. Lemma shorter, or barely equalling the empty glumes, thin-hyaline, awnless or awned. Palet small, thin-hyaline, or often wanting. Stamens usually 3. Styles short, distinct; stigmas plumose

Rachilla prolonged above the palet, naked or minutely pubescent, lemma equalling the empty glumes, palet nearly as long.

Spikelets about 3 mm long, purple, rachilla one-third to one-half as long as the flower.

Spikelets about 2 mm long, rachilla less than one-third as long as the flower

Empty glumes dark purple, broadly lanceolate, abruptly acute or acuminate; inflorescence short and open, stem few-leaved

Empty glumes green, only tinged with purple towards the tip, narrowly lanceolate, gradually acute, inflorescence long and narrow, stem leafy

Rachilla not prolonged above the palet, lemma shorter than the empty glumes.

Palet evident, 2-nerved, at least one-fourth as long as the lemma

Empty glumes obtuse, scabrous on the back, panicle dense; branches flower-bearing from the base, verticillate

Empty glumes acute or acuminate, glabrous or scabrous on the keel only

Plant erect or decumbent at the base, but not extensively stoloniferous

Plant tall, usually over 3 dm high, panicle large, open, spikelets over 2 mm long

Plant low, slender, 1-3 dm high, panicle narrow, spikelets about 2 mm long or less

Lemma nearly as long as the empty glumes, palet about two-thirds as long as the lemma, plant erect

Lemma one-third shorter than the empty glumes, palet about one-half as long as the lemma, plant decumbent at the base.

Plant extensively stoloniferous, stolons with short leaves, palet one-fourth to one-half as long as the lemma

Palet lacking or minute

Plant with creeping rootstock.

Plant tufted, without creeping rootstock

Panicle dense and narrow, branches ascending or erect, flower-bearing to near the base

Plant over 3 dm high, empty glumes 2.5-3 mm long

Panicle lobed or interrupted, branches densely verticillate and flower-bearing to the base, empty glumes narrowly lanceolate, gradually attenuate, ligules 4-5 mm long, lacerate, leaf-blades 6-10 mm wide

Panicle usually contiguous, branches few and some naked at the base, empty glumes lanceolate, abruptly pointed, ligules 2-4 mm long, entire or toothed, leaf-blades 2-5 mm wide

Plant 1-2 dm high, empty glumes 2 mm long or less

Basal leaf-blades flat, 2 mm wide, lemma two-thirds as long as the empty glumes, obtuse

Basal leaf-blades 1 mm wide or less, conduplicate; lemma three-fourths as long as the empty glumes, acute

Panicle open, branches more or less spreading, or sometimes reflexed

Lemma awnless or with a very short awn

Panicle oblong-ovoid, its branches ascending

Plant 1-4 dm high, empty glumes unequal, 1.5-2 mm long

Plant 3-6 dm. high, empty glumes equal or nearly so, 3 mm long.

Panicle triangular-ovoid or broadly conic, branches at least in age divaricate or even reflexed

Leaf-blades filiform, 1 mm wide or less, usually involute; the basal ones numerous, upper sheaths close

Leaf-blades usually flat, 1-3 mm wide, upper sheaths loose

Lemma awned, awn equalling or exceeding the glume.

Panicle open, diffuse, branches spreading or ascending

Leaf-blades about 0.5 mm wide; panicle broadly conic; branches very scabrous, in age spreading or reflexed.

Leaf-blades 1-2 mm. wide, panicle ovoid, branches ascending.

Panicle narrow; branches nearly erect

1. A. aequalis Trin Tufted perennial; stems 2-6 dm. high; leaf-blades erect, 4-6 cm. long, 1-2 mm wide, somewhat scabrous; panicle open, 5-15 cm. long, empty glumes equal, acuminate, scabrous on the keel towards the end; lemma obtuse. Meadows. Alaska—B C.—Ore.; Lab Subalp. Je-Au.

2. *A. atrata* Rydb. A somewhat tufted perennial; stems 1.5-3 dm high, few-leaved, more or less bulbous at the base; leaf-blades 5-10 cm. long, about 2 mm. wide, flat, smooth; panicle 5-8 cm long; empty glumes nearly equal; lemma nearly as long, obtusish. Mountains: B.C. *Mont—Subalp.*

3. *A. Thurberiana* Hitchc. Tufted perennial; stem 2-4 dm high, leafy; leaf-blades 5-10 cm. long, 2 mm. wide, lax, light green; panicle more or less drooping, 5-20 cm. long; empty glumes about 2 mm. long, narrow, gradually acute; lemma nearly as long, obtuse, faintly 5-nerved. Meadows: B.C.—Mont.—Utah—Calif. *Submont.—Subalp.* JI—Au.

4. *A. stolonifera* L. Perennial, with a long creeping rootstock and stolons; stem 2-8 dm. high; leaf-blades 5-10 cm long, 3-4 mm. wide, light- or glaucous-green, scabrous; panicle interrupted, 3-10 cm. long; empty glumes obtuse, scabrous on the keel and back, 2 mm long; lemma about half as long, awnless, truncate and toothed at the apex. *A. verticillata* Vill. Wet meadows: Tex—Utah—Calif; Mex, C. Am., S. Am., Eu., Africa and Asia. *Son—Submont.* F—O

5. *A. alba* L. Tufted perennial; stems 2-15 dm. high, erect or decumbent at the base; leaf-blades 4-15 cm long, 3-8 mm. wide, panicle upright, 5-30 cm. long, with spreading branches, the lower usually verticillate; empty glumes 2-3 mm. long, pale or purplish, nearly equal, acute, lemma two-thirds to three-fourths as long, obtuse, seldom awned. Wet meadows: Newf.—Fla.—Calif.—B.C.; Eurasia. *Plain—Submont.* Je—O.

6. *A. humilis* Vasey. Tufted perennial; stems 1-4 dm. high, slender, 1-3-leaved; leaves mostly basal; leaf-blades 2-10 cm long, 1 mm wide or less, usually conduplicate; panicles 2-5 cm long; branches ascending; empty glumes equal, abruptly pointed, 1.5-2 mm. long, purple, lemma nearly as long, awnless. High mountains: B.C.—Ore—Colo.—Wyo. *Mont.—Alp.* Au—O.

7. *A. depressa* Vasey. Tufted perennial; stems decumbent and geniculate at the base, 1.5-2.5 dm. high, slender, leafy below, leaf-blades 3-5 cm. long, 1 mm. wide, flat; panicle narrow, 3-5 cm long, in age open; empty glumes 2 mm. long, acute; lemma obtuse or minutely dentate at the apex. Mountains: Colo. *Mont—Subalp.* JI.

8. *A. reptans* Rydb. Cespitose and stoloniferous perennial; stems 2-3 dm. long; leaves 2-6 cm. long, 1-2 mm. wide, flat; panicle 3-5 cm. long; branches ascending, flower-bearing to near the base; empty glumes purplish, nearly equal, acute; lemma one-third shorter, toothed at the apex, often with a minute awn. *A. exarata stolonifera* Vasey. Bottom lands: B.C.—Calif. *Submont.* JI—Au.

9. *A. foliosa* Vasey. Perennial, with a creeping rootstock; stem 5-10 dm high; leaf-blades 8-15 cm. long, 3-4 mm wide, panicles open, but often narrow; 1-1.5 dm long; branches ascending, naked below, empty glumes pale, nearly equal, 2-3 mm. long, abruptly acute; lemma nearly as long, obtuse and minutely toothed at the apex, awnless or short-awned. Wet meadows: B.C.—Ida—Calif. *Submont.* Je—Au.

10. *A. grandis* Trin. Tufted perennial; stem 5-15 dm. high; leaf-blades 1-2 dm. long, 6-10 mm wide, very scabrous, abruptly contracted at the ligules; panicle 1-2 dm long, dense, contracted; empty glumes about 3 mm. long, gradually tapering at the apex, light green, scarious-margined; lemma one-half to two-thirds as long, obtuse. Wet meadows: B.C.—Mont.—Neb.—N.M.—Calif. *Plain—Mont.* Je—JI.

11. *A. asperifolia* Trin. Tufted perennial; stem 3-6 dm. high; blades 5-15 cm. long, 2-5 mm. wide, scabrous; panicle 5-10 cm. long, narrow and dense; empty glumes broadly lanceolate, 2.5-3 mm long, usually abruptly pointed, often tinged with purple; lemma two-thirds to three-fourths as long, awnless; *A. exarata minor* Hook. *A. Drummondii* Torr. Wet meadows: Man.—Neb.—N.M.—Calif.—B.C. *Plain—Mont.* Je—Au.

12. *A. Rossae* Vasey. Cespitose perennial; stem about 1.5 dm. high, smooth, erect; leaf-blades 2-4 cm. long, flat, 2 mm. wide; panicle oblong, 2-4 cm. long, dense; branches nearly erect, 1-2 cm. long, very scabrous; empty glumes 2 mm.

long, broadly lanceolate, acute; lemma minutely toothed at the apex. Mountains: Wyo.—Colo.—N.M. *Mont.*—*Subalp.* Au.

13. *A. variabilis* Rydb. Tufted, dwarf perennial; stem 1-2-leaved, 1-2 dm. high; basal leaves numerous, their blades 2-5 cm. long; stem-leaves somewhat broader and often flat; panicle contracted, 3-6 cm. long, about 5 mm. wide; branches erect or nearly so, usually short; empty glumes 2 mm. long, usually more or less purplish, nearly equal, acute; lemma 1.5 mm. long, awnless. Mountains: B.C.—Alta.—Colo.—Calif. *Mont.*—*Subalp.* Jl-S.

14. *A. idahoensis* Nash. Tufted perennial; stem slender, 1-4 dm. high; leaf-blades narrow, 4-9 cm. long, 1-2 mm. wide, flaccid, somewhat scabrous; panicle oblong-ovoid, 5-12 cm. long, 2.5-4.5 cm. wide; empty glumes unequal, 1.5-2 mm. long, acuminate, purple; lemma two-thirds to three-fifths as long as the first glume. *A. tenuiculus recta* Nash. Mountain meadows: Wash.—Mont.—Colo. *Submont.*—*Subalp.*

15. *A. oregonensis* Vasey. Tufted perennial; stem 3-6 dm. high; leaf-blades 5-10 cm. long, 1-2 mm. wide, often involute; panicle 8-15 cm. long, often nodding, flexuose; empty glumes purple, narrowly lanceolate, gradually acute; lemma slightly shorter than the empty glumes, obtuse. Meadows: Wash.—Ore.—Wyo. *Submont.* Jl-Au.

16. *A. oreophila* Trin. Densely caespitose perennial; stems slender, 2-4 dm. high; leaf-blades filiform-setaceous, involute; those of the stem slightly broader, about 1 mm. wide, scabrous, panicle 1-2 dm. long; lower branches 5-10 cm. long; empty glumes slightly unequal, about 2 mm. long, pale or purple, acute. *A. hemalis geminata* Hitchc., in part. Mountains: Que.—Me.—N.Y.—Pa.—Sask.—Colo.—Utah—B.C. *Boreal.*—*Mont.*—*Subalp.* Jl-S.

17. *A. hyemalis* (Walt.) B.S.P. Tufted perennial; stem 2-8 dm. high; leaf-blades 2-3 mm. wide, flat, 5-10 cm. long; panicle large and diffuse, 2-6 dm. long; spikelets crowded at the ends of the branches; empty glumes nearly equal, purplish or pale, about 2 mm. long, acute or acuminate, lemma obtuse, two-thirds to three-fourths as long. *A. scabra* Willd. Open places: Lab.—Fla.—Calif.—Alaska; Mex. *Plain.*—*Subalp.*

18. *A. geminata* Trin. Caespitose perennial; stem 2-3 dm. high, glabrous, slender; leaf-blades about 0.5 mm. wide, 5-10 cm. long, the basal ones usually involute; those of the stem-leaves usually flat; inflorescence 5-15 cm. long, 4-8 cm. wide; empty glumes about 3 mm. long, acute; lemma two-thirds to three-fourths as long, obtuse, bearing at the middle of the back a straight awn. Wet places: Alaska—B.C. *Subalp.*—*Alp.* Jl-Au.

19. *A. Bakeri* Rydb. Caespitose perennial; stem about 3 dm. high, erect, slightly geniculate below, glabrous, basal leaves numerous; leaf-blades flat, 1-2 mm. wide, 5-10 cm. long; panicle ovoid, 8-10 cm. long, open; empty glumes nearly equal, purple, 2-2.5 mm. long, acuminate; lemma three-fourths as long, obtuse, bearing above the middle a dorsal straight awn. Mountains: Colo. *Mont.*

20. *A. melaleuca* (Trin.) Hitchc. Caespitose perennial; stem erect, 2-5 dm. high; leaf-blades flat, 1-2 mm. wide, 5-10 cm. long; branches of the panicle flower-bearing to near the base; empty glumes copper-colored or purplish, lanceolate, gradually acute or acuminate, 2.5-3 mm. long; lemma slightly shorter, bearing above the middle a straight awn. *A. canina* Rydb. (Fl. Colo.) Wet places: Alaska—B.C.—Colo. *Mont.*—*Subalp.* Jl-Au.

31. CALAMAGRÓSTIS Adans. REED-GRASS.

Erect perennials. Inflorescence paniculate. Spikelets numerous, 1-flowered; flowers perfect; the rachilla usually produced beyond the flower; the prolongation with a hair-pencil. Empty glumes 2, persistent, narrow, keeled, acute or acuminate. Lemma much shorter, thickly hyaline, with a basal ring of long hairs, and a dorsal awn. Palea small, narrow, thin, hyaline. Styles short, distinct; stigmas plumose.

- Awn of the lemma geniculate, exserted, callus-hairs usually much shorter than the glume.
 Awns of the lemma greatly exceeding the empty glumes; plant tufted, leaf-blades involute
 Empty glumes very scabrous throughout, marcescent basal leaf-sheaths very long, loose and numerous 1 *C. purpurascens*
 Empty glumes nearly glabrous, except on the keels, marcescent basal leaf-sheaths short and few 2. *C. Vaseyi*
 Awns of the lemma about equalling the empty glumes
 Empty glumes sharply keeled, spikelets strongly compressed, plant stoloniferous. 3 *C. montanensis*
 Empty glumes not strongly keeled, spikelets not strongly compressed, plants tufted
 Leaves usually involute, panicle very dense
 Panicle very narrow, spike-like, usually red-purplish 4 *C. rubescens*
 Panicle lance-oblong, usually pale green 5 *C. Suksdorfi*
 Leaves usually flat, panicle ovoid, open 6 *C. luxurians*
 Awn of the lemma straight or nearly so, included, callus-hairs usually equalling the lemma (except in *C. scopulorum* and *C. Cusickii*)
 Panicle open, the lower branches spreading, leaf-blades usually flat, callus-hairs nearly or quite equalling the lemma.
 Empty glumes 4-6 mm long, narrow, sharp-acuminate, awn of the lemma attached below the middle, exceeding the lemma 7 *C. Langsdorfi*
 Empty glumes 2-4 mm long, awn of the lemma attached at or above the middle, shorter than the lemma
 Awn attached near the middle of the lemma, spikelets usually purple
 Spikelets 3-4 mm long, panicle loosely flowered 8 *C. canadensis*
 Spikelets 2-2.5 mm long, panicle densely flowered 9 *C. Macouniana*
 Awn attached near the apex of the lemma, spikelets pale or white 10 *C. blanda*
 Panicle more or less contracted
 Leaf-blades flat or nearly so
 Empty glumes smooth or nearly so, except on the veins
 Callus-hairs copious, at least two-thirds as long as the lemma, plant with a rootstock 11. *C. Scribneri*
 Callus-hairs sparse, much shorter than the lemma
 Plant tall, 9-12 dm high, sheaths bearded at the summit, plant with a rootstock 12 *C. Cusickii*
 Plant lower, 3-8 dm high; sheaths not bearded, plant tufted 13 *C. scopulorum*
 Empty glumes very scabrous, plant tufted 14 *C. elongata*
 Leaf-blades strongly involute
 Panicle open 15 *C. lucida*
 Panicle dense, narrow, spike-like
 Spikelets 2 mm long, empty glumes thickish, barely acute or obtusish 16 *C. macrantha*
 Spikelets 3-4.5 mm long
 Plant scarcely caespitose, empty glumes long-acuminate
 Leaves filiform, soft, plant 4-6 dm high, slender, empty glumes minutely scabrous on the veins 17. *C. neglecta*
 Leaves stiff and hard, plant 8-12 dm high, empty glumes strongly scabrous 18. *C. inexpansa*
 Plant densely caespitose, empty glumes abruptly acute or short-acuminate, very scabrous 19 *C. americana*

1. *C. purpurascens* R. Br. Tufted perennial; stem 3-6 dm. high; leaves numerous and crowded at the base; blades of the basal leaves 2-4 dm long, 4-5 mm. wide, scabrous, rigid, more or less involute; those of the stem 7-15 cm. long; panicle spike-like, strict, 7-10 cm. long, purplish; spikelets 6-7 mm long; lemma slightly shorter than the glumes, acute or acuminate; awn near the base, twisted below and bent at the middle. Mountains. Greenl.—S.D.—Colo.—Calif.—Alaska. *Mont.*—*Alp.* JI-S.

2. *C. Vaseyi* Beal. Tufted perennial; stem 3-7 dm. high, leafy; leaf-blades 1.5-2 dm. long, 3-7 mm. wide, the lower involute, the upper often flat, panicle spike-like, 7-10 cm long, usually more or less purple; empty glumes 4-5 mm long, equal, lanceolate; lemma one-fourth shorter, obtuse; awn inserted one-third from the base and extending little beyond the empty glumes. Mountains: Ore.—Wash.—Mont. *Alp.*—*Subalp.* JI-Au

3. *C. montanensis* Scribn. Stoloniferous perennial; stem 2-4 dm. high, stiff, erect; leaf-blades 5-15 cm. long, strongly involute, scabrous; panicle spike-like, 5-8 cm. long, dense; empty glumes narrowly lanceolate, acute, 4-6 mm. long, scabrous, pale or purple; lemma one-fourth shorter, thin, finely scabrous, awn borne one-third from the base. Dry plains: Sask.—S.D.—Ida.—Alta. *Plain*—*Submont.* JI-Au.

4. *C. rubescens* Buckley. Cespitose perennial; stem 4-10 dm. high; leaf-blades 5-15 cm. long, involute, scabrous, stiff; panicle strict, spike-like, purplish, 5-15 cm. long; empty glumes 4-5 mm. long, acute, minutely scabrous; lemma about as long, awned below the middle. Grassy banks: B.C.—Alta.—Wyo.—Calif. *Submont.*—*Mont.* JI—Au.

5. *C. Suksdorfii* Scribn. Tufted perennial; stem 6-10 dm. high; leaf-blades 1-3 dm. long, mostly involute; panicles 7-12 cm. long, narrow, but not spike-like, often lobed and interrupted; empty glumes 3-4 mm. long, acute, pale, and somewhat translucent, nearly smooth; lemma one-fourth shorter, oblong, obtuse, 4-toothed, awned near the base. Open woods and banks: Sask.—Wyo.—Calif.—B.C. *Submont*—*Mont.* Je—Au.

6. *C. luxurians* (Kearney) Rydb. Tufted perennial; stem 1-1.5 m. high; leaf-blades flat, 1.5-3 dm. long, 4-5 mm. wide, scabrous; panicle 1-2 dm. long, ovoid, pale, open; empty glumes narrowly lanceolate, acute; lemma one-fourth or one-fifth shorter, nearly glabrous, awn-bearing near the base. *C. Suksdorfii luxurians* Kearney. Open woods: B.C.—Mont.—Colo.—Ida. *Submont.* Je—Jl.

7. *C. Langsdorfii* (Link) Trin. Perennial, with a rootstock; stem 3-6 dm. high, erect, simple; leaf-blades 1-3 dm. long, 4-8 mm. wide, scabrous, usually flat and spreading; panicle 5-15 cm. long; empty glumes 4-6 mm. long, long-acuminate, strongly scabrous, lead-colored, brown or purplish; lemma one-fourth shorter, scabrous, awned below the middle. Alpine-arctic situations: Greenl.—N.C.—Sask.—N.M.—Calif.—Alaska. *Mont.*—*Alp.* JI—S.

8. *C. canadensis* (Michx.) Beauv. Perennial, with a rootstock; stems 5-15 dm. high, erect, simple; blades 1.5-3 dm. long, 2-8 mm. wide, scabrous, usually flat, panicle 1-2 dm. long, open, usually purple; branches spreading; empty glumes 3-3.5 mm. long, acute, or (in var. *acuminata*) 3.5-4 mm. long and acuminate, scabrous; lemma slightly shorter, scabrous, awn-bearing near the middle; awn slender, nearly equalling the glumes. Banks and swamps: Newf.—N.C.—N.M.—Calif.—Alaska. *Plain*—*Subalp.* JI—S.

9. *C. Macouniana* Vasey. Perennial; stem 6-10 dm. high, erect, somewhat branched below, leafy; leaf-blades flat, 1.5-2.5 dm. long, panicle 7-10 cm. long, lanceolate or conic, open; spikelets crowded on the upper part of the branchlets; empty glumes about 4 mm. long, purplish, acute, finely scabrous on the back; lemma equalling the empty glumes. Wet places Man.—S.D.—Wash. *Plain*—*Submont.*

10. *C. blanda* Beal. Perennial, with a rootstock; stem 6-12 dm. high; leaf-blades 1.5-2 dm. long, 4-8 mm. wide, flat, scabrous; panicle 1.5-2 dm. long, loose, spreading; empty glumes about 3 mm. long, long-acuminate, scabrous on the veins, lemma one-fourth shorter, thin, acutely toothed. *C. pallida* Vasey & Scribn. Wet places: Colo.—Mont.—Wash. *Submont.* JI.

11. *C. Scribneri* Beal. Perennial, with a rootstock; leaf-blades flat, 1-2 dm. long, 4-5 mm. wide, scabrous; panicle contracted, lanceolate, 1-1.5 dm. long; branches flower-bearing to near the base; empty glumes brown or purple, about 4 mm. long, lanceolate, acute or acuminate, lemma one-fourth shorter; awn attached below the middle, exceeding the lemma. *C. dubia* Scribn. Wet places: Alta.—Colo.—Wash.—B.C.; Que. *Mont.*—*Subalp.* JI—Au.

12. *C. Cusickii* Vasey. Perennial, with a creeping rootstock; stem 10-12 dm. high; leaf-blades flat, 1-3 dm. long, 5-8 mm. wide; panicles about 1.5 dm. long, acute, narrow; branches flower-bearing to the base; glumes about 4 mm. long, acute or acuminate, smooth, thin; lemma nearly as long as the empty glumes, acuminate; awn erect, inserted a little below the middle, slightly exceeding the lemma. Wet places Ore.—Ida.—Calif. JI.

13. *C. scopulorum* M. E. Jones. Tufted perennial; stem 3-8 dm. high; leaf-blades 1-3 dm. long, 6 mm. wide, flat, pale; panicle narrow, 1-1.5 dm. long; empty glumes about 4 mm. long, white or pale, acute, smooth except on the nerves; lemma nearly as long; awn attached below the middle, shorter than the lemma. Mountains and hills. Utah—Colo. *Son.*—*Mont.* Au—S.

14. *C. elongata* (Kearney) Rydb. Tufted perennial; stem 7–12 dm. high; leaf-blades 1–3 dm. long, usually flat, 3–8 mm. wide, scabrous; panicle 1–2 dm. long, narrow but scarcely spike-like; empty glumes 3–4 mm. long, acute, very scabrous; lemma somewhat shorter, scabrous; awn attached below the middle. *C. hyperborea elongata* Kearney. Wet meadows: Ont.—Pa.—Colo.—Calif.—B.C. *Plain—Mont.* Jl–Au

15. *C. lucida* Scribn. Perennial, with a slender rootstock; stem 2.5–4 dm. high, slender with few marcescent sheaths at the base; leaf-blades 5–13 cm. long, 2–3 mm. wide, strongly involute, slightly scabrous on the margins and nerves; panicle 4.5–7 cm. long, ovoid to lanceolate, strongly flexuose; empty glumes about 3 mm. long, short-acuminate, strongly keeled, minutely hispidulous on the keel; lemma slightly shorter; awn attached near the middle. *C. laxiflora* Kearney. Meadows: Wyo. Au.

16. *C. micrantha* Kearney. Perennial, with a slender, creeping rootstock; stems 4–6 dm. high, slender; leaf-blades 5–20 cm. long, 1–1.5 mm. wide, more or less involute, filiform; panicle 5–8 dm. long, densely-flowered, purple or pale; empty glumes 2 mm. long, scabrous; lemma slightly shorter; awn attached at or below the middle. Wet places: Sask.—Colo. *Plain—Mont.* Jl–Au

17. *C. neglecta* (Ehrh.) Gaertn. Perennial, with a rootstock; stem 4–6 dm. high, slender; leaves narrow, involute, soft, 5–15 cm. long; panicle contracted, 6–10 cm. long; branches mostly erect; empty glumes about 4 mm. long, gradually acute; lemma about one-fourth shorter, obtuse; awn attached near the middle. *C. stricta* Trin. Wet places: Greenl.—Me.—Wis.—Colo.—Ore.—Alaska; Eu. *Plain—Subalp.* Jl–S.

18. *C. inexpansa* A. Gray. Perennial, with a rootstock; stem usually simple, 8–12 dm. high; leaf-blades 2–3 dm. long, 4 mm. wide or less, scabrous; panicle 1.5–2 dm. long, usually nodding at the summit, empty glumes 4–4.5 mm. long, very scabrous throughout, gradually acute; lemma scabrous, about as long, acutish; awn inserted below the middle, about equalling the lemma. Wet places: N.Y.—N.J.—S.D.—Colo.—Ida.—Wash.—B.C. *Plain—Submont.* Jl–Au.

19. *C. americana* Scribn. Cespitose perennial, with numerous marcescent sheaths at the base; stem 3–6 dm. high, scabrous above; leaf-blades 1–3 dm. long, 4–5 mm. wide, usually more or less involute, scabrous, stiff; panicle contracted, 7–15 cm. long, spike-like; empty glumes 3–4 mm. long, very scabrous; lemma nearly as long, acute, scabrous; awn attached below the middle. *C. hyperborea* Kearney, not Lange. Wet meadows: Lab.—Vt.—Neb.—Colo.—Calif.—Alaska. *Plain—Submont.* Jl–Au.

32. CALAMOVÍLFA Hack. REED-GRASS, SAND-GRASS

Tall perennials with horizontal rootstocks and elongated narrow leaf-blades. Inflorescence a panicle. Spikelets flattened, 1-flowered, crowded, the rachilla articulated above the empty glumes and not prolonged beyond the flower. Empty glumes 2, unequal, persistent, rigid, chartaceous, awnless, keeled, 1-nerved; lemma with a ring of long hairs at the base, enclosing a 2-keeled palet and a perfect flower. Stamens 3. Styles distinct, stigmas plumose.

1. *C. longifolia* (Hook.) Hack. Perennial, with a long, scaly rootstock; stem 6–20 dm. high, stout, smooth, and glabrous; leaf-blades 2–3 dm. long, stiff, more or less involute; panicle 1–4 dm. long, pale, narrow; empty glumes 6–8 mm. long, the first shorter than the second; lemma about as long as the second glume, glabrous; callus-hairs copious, half as long as the lemma. *Calamagrostis longifolia* Hook. Sandy soil: Ont.—Ind.—Colo.—Ida.—Sask. *Plain—Submont.* Je–S.

33. DESCHÁMPsia Beauv. HAIR-GRASS

Perennials or annuals. Inflorescence a terminal contracted or open panicle. Spikelets 2-flowered, the rachilla articulated above the empty glumes and prolonged beyond the flowers. Empty glumes 2, persistent, keeled, acute, mem-

branous, usually somewhat shining. Lemma thin-membranous, almost hyaline, entire or toothed, acute, obtuse, or truncate and denticulate at the apex, each bearing a slender dorsal straight or geniculate awn, which is twisted at the base. Palea narrow, 2-nerved. Stamens 3. Styles distinct; stigmas plumose.

Empty glumes not extending beyond the apex of the upper lemma; lower empty glume 1-nerved, densely cespitose tufted perennials.

Leaves neither stiff nor pungent.

Awn Inserted one-third to one-fifth from the base of the lemma, branches of the inflorescence at last spreading or reflexed.

Awns long-exserted, at least half longer than the lemma

Empty glumes 3-4 mm long, leaves filiform, revolute, scarcely 1 mm. wide, plant 2-3 dm high

Empty glumes 4-5 mm long; leaves broader and often flat, 1.5-2.5 mm. wide, plant 3-5 dm high

Awns scarcely exserted beyond the lemma.

Awn Inserted near the base of the lemma, slightly if at all exceeding it, branches of the inflorescence ascending

Leaves arcuate, strongly involute, very stiff and pungent.

Empty glumes extending beyond the apex of the upper lemma

Spikelets usually dark purple, empty glumes lanceolate, purple, about 5 mm. long, the lower 1-nerved

Spikelets light green, empty glumes linear-lanceolate, both 3-nerved.

Spikelets 3-5 mm long, tufted perennials

Leaves filiform-involute, sheaths close, spikelets 3-4 mm long

Leaves involute but not filiform, or the stem-leaves flat; upper sheaths loose; spikelets 4-5 mm long

Spikelets 5-8 mm long, annuals

1. *D. curtifolia* Scribn. Basal leaf-blades 1-10 cm. long, the cauline ones 1-2 cm. long; panicle small, 3-10 cm. long, its branches in 2's or 3's, or single, at last spreading; empty glume 3-4 mm. long, lanceolate, acute; lemma nearly as long *D. brevifolia* R. Br. *D. brachyphylla* Nash. Alpine ridges: Colo.—Utah—Mont. *Subalp.*—*Alp.*

2. *D. alpicola* Rydb. Basal leaf-blades 1-2 dm. long; stem-leaves 1-4 cm. long, panicle short, open, 8-15 cm. long, its branches in 2's to 5's, 3-6 cm. long, soon spreading; spikelets about 5 mm. long, empty glumes lanceolate, acute; lemma nearly as long, hirsute at the base. *Deschampsia caespitosa alpina* Vasey. Alpine meadows: N. M.—Wyo.—Utah. *Mont.*—*Alp.* Jl-S.

3. *D. caespitosa* (L.) Beauv. Stem 3-10 dm. high; basal leaf-blades 2-5 cm. long, 1.5-3 mm. wide, flat or in drier situations involute, rather firm; stem-leaves 3-10 cm. long; panicles 1-3 dm. long, 5-15 cm. wide; empty glumes 3.5-5 mm long, lanceolate, acute or acuminate; lemma 3-4 mm. long, purple or lead-colored. Wet meadows and swamps. Newf.—N. J.—N. M.—Calif.—Alaska. *Submont.*—*Subalp.* Je-S.

4. *D. confinis* (Vasey) Rydb. Stem 3-9 dm. high, glabrous; leaf-blades 1-3 dm. long, more or less involute when dry, panicle narrow, 1-3 dm. long, the base often included in the upper sheath, empty glume unequal, 4-5 mm long, lead-colored or purplish with straw-colored margins, lanceolate, acute; lemma nearly as long, lanceolate, acute. Wet places: s Calif.—s Utah—Ariz. *Son.* Je—Au

5. *D. pungens* Rydb. Stem 3-4 dm. high, glabrous and shining, the base covered with subchartaceous sheaths from preceding season; leaf-blades bluish green or in age straw-colored, scabrous-pruinose; panicle open, with spreading branches; empty glumes subequal, 3.5-4.5 mm long, purplish, lanceolate, acute; lemma 3-3.5 mm. long, similar; awn attached at the base, about equalling the lemma. Near hot springs: Alta.—Wyo. *Mont.* Jl—Au.

6. *D. atropurpurea* (Wahl.) Scheele. Perennial, with a cespitose root-stock; stem glabrous, 1.5-5 dm. high; leaf-blades 2-5 mm. wide, 5-12 cm. long, flat and flaccid, panicle narrow, 2-10 cm. long, with short erect branches; lemma about 3 mm. long, erose-truncate at the apex; awn attached about the middle, bent. *D. latifolia* (Hook.) Vasey. *D. Hookeriana* Scribn. Wet places: Greenl.—N. H.—Colo.—Calif.—Alaska; n Eu. *Subalp.*—*Alp.* Jl-S.

7. *D. elongata* (Hook.) Munro. Stem 3-10 dm. high, slender; leaf-blades 5-10 cm. long, 1 mm. wide; panicle very narrow, 1-2 dm. long, with erect

branches; empty glumes 3-4 mm long, 3-nerved, green; lemma about 2 mm. long, irregularly 5-toothed at the apex; awn inserted near the base, almost twice as long as the lemma. Wet places: B.C.—Calif.—Ariz.—Wyo.—Mont, Mex. *Submont.* Je—Au.

8. *D. ciliata* (Vasey) Rydb. Stem 4-7 dm. high, comparatively stiff; leaf-blades 1-2 dm. long, about 2 mm. wide; panicle elongated, with nearly erect branches; empty glumes minutely scabrous; lemma 3 mm long, crose-dentate at the apex; awn attached a little below the middle, 2-3 times as long as the lemma. *D. elongata ciliata* Vasey. Wet places: B.C.—Calif.—Ida. *Submont.* My—Jl.

9. *D. calycina* Presl. Annual, simple or branched at the base; stems 1-4 dm. high; leaf-blades 1-10 cm. long, filiform; inflorescence ovoid, 3-20 cm. long, with ascending branches; spikelets usually purplish; empty glumes linear-lanceolate, acuminate, 3-nerved; lemma 3 mm. long, 3-toothed at the apex; awn attached near the middle, about 3 times as long as the lemma. Wet places: Yukon—B.C.—Ida.—Ariz.—Calif. *Submont.* My—Jl

34. **TRISËTUM** Pers. FALSE OAT.

Annual or perennial tufted grasses, with flat leaf-blades. Inflorescence a spike-like contracted or open panicle. Spikelets usually 2-flowered, rarely 3-6-flowered, the flowers perfect, or the upper one staminate. Empty glumes membranous, unequal, acute, entire at the apex, awnless, persistent. Lemma 2-toothed at the apex, the teeth acuminate and often terminating in a bristle or slender awn; awn often twisted, inserted below the apex and arising between the teeth. Palea hyaline, 2-toothed. Styles distinct, stigmas plumose.

Inflorescence lanceolate, open, lower empty glume shorter than and scarcely more than half as broad as the upper; leaf-blades broader than the sheaths and therefore with auricles at the base.

Lemma about 7 mm. long, sheaths hairy

1. *T. canescens.*

Lemma about 5 mm long, sheaths glabrous

Ovary pubescent at the apex, panicle loose, its branches spikelet-bearing above the middle.

2. *T. cernuum*

Ovary glabrous, panicle denser, its branches spikelet-bearing to the base

3. *T. montanum*

Inflorescence dense, oblong or oblong-lanceolate, lower empty glume nearly as broad as the upper, leaf-blades not broader than the sheaths, not auricled.

Leaf-sheaths and blades long-hairy, upper part of the stem densely pubescent

4. *T. subspicatum*

Leaf-sheaths and blades glabrous or the lowest sheath short-pubescent, with reflexed hairs, stem glabrous or slightly scabrous in the inflorescence

5. *T. majus*

1. *T. canescens* Buckl. Perennial, with a rootstock, more or less caespitose; stem 5-10 dm. high; leaf-blades 1-1.5 cm. long, about 5 mm wide; panicle 1.5-3 dm. long, narrow; branches spikelet-bearing to near the base; spikelets 2-3-flowered, awn about twice as long as the lemma. Open woods and hillsides: B.C.—Mont.—Calif. *Submont.* Je—Au.

2. *T. cernuum* (Kunth) Trin. Perennial, with a rootstock; stem 6-10 dm. high; leaves glabrous; blades 1-2 dm. long, 5-7 mm wide; panicle 1-2.5 dm. long, open and nodding; spikelets 2-3-flowered; lemma about 6 mm. long, slightly scabrous above; awn twice as long as the lemma. Stream-banks: Alaska—Ida.—Calif. *Submont.* Je—S.

3. *T. montanum* Vasey. Perennial, with a rootstock, stem 4-10 dm. high, glabrous; leaf-blades glabrous, 1.5-2.5 dm. long, 3-5 mm broad; panicle 1-2 dm. long, with ascending branches; spikelets about 5 mm long; upper glume 4 mm. long, broadly lanceolate; lemma about 4 mm. long; awn about twice as long as the lemma. Moist places among bushes: Wyo.—N.M.—Utah. *Submont.*—Mont. Jl—S.

4. *T. subspicatum* (L.) Beauv. Caespitose perennial; stems 2-4 dm. high; leaf-blades 3-15 cm. long, 2-3 mm. wide, flat or in age involute; panicle oblong, often obtuse, usually more or less purple, 2-8 cm. long; empty glumes lanceolate, acuminate or acute, slightly shorter than the lemma; awn bent and twisted, 7-8 mm. long. *T. subspicatum molle* A. Gray. *T. spicatum* (L.) Richter. Mead-

ows and hillsides: Greenl.—N.H.—N.M.—Calif.—Alaska; Eurasia. *Subalp.*—*Alp.* Jl—Au.

5. *T. majus* (Vasey) Rydb. Cespitose perennial; stems 2-5 dm. high, glabrous; leaf-blades 5-15 cm. long, 1-4 mm. wide, usually flat; panicle often interrupted, acute, green, rarely purple, 6-15 cm. long; empty glume lanceolate, acuminate, about 6 mm. long, usually a little longer than the lemma; awn bent and twisted, 7-8 mm. long. *T. subspicatum* Am. auth., not Beauv. Meadows: Mont—Colo.—Utah—B.C. *Submont.*—*Subalp.*

35. GRAPHEPHORUM Desv.

Erect perennials, with short rootstocks. Inflorescence paniculate. Spikelets 2-4-flowered, flattened, the rachilla hirsute and extending beyond the flowers. Empty glumes 2, somewhat shorter than the lemma, thin-membranous, acute, keeled, shining. Lemma membranous, obscurely nerved, entire, sometimes short-awned just below the apex, shining; awn straight. Styles distinct; stigmas plumose.

Empty glumes nearly equal, inflorescence narrow.

Sheaths and upper surface of the leaves pubescent, spikelets 3-flowered.

1 *G. muticum*.

Sheaths and leaves scabrous.

Empty glumes barely equalling the lemma, spikelets 2-flowered, rudiment long-hairy.

2 *G. Wolffii*.

Empty glumes longer than the lemma, spikelets 3-4-flowered; rudiment short-hairy.

3 *G. Brandegei*.

Empty glumes unequal, inflorescence open.

4 *G. Shearii*.

1. *G. muticum* (Bolander) Greene. Stem 4-8 dm. high; leaf-blades 1-4 dm. long, 3-6 mm. wide; inflorescence 1-2 dm. long; empty glumes 6-7 mm. long, acute, scabrous on the back; lemma 5-6 mm. long, minutely scabrous; awn very short, or almost none. *Trisetum muticum* Scribn. Meadows: Calif.—Wash.—Mont. *Submont.*—*Subalp.* Je—Jl.

2. *G. Wolffii* Vasey. Stem erect from a decumbent base; leaf-blades 5-15 cm. long, 1.5-3 mm. wide, panicle 5-10 cm. long, with few branches; empty glumes 4-5 mm. long, slightly shorter than the lemma, acuminate; lemma 2-toothed at the apex; awn about 1 mm. long. Mountain meadows. Colo. *Subalp.*

3. *G. Brandegei* (Scribn.) Rydb. Stem 3-6 dm. high, smooth; leaf-blades 1-2 dm. long, 4-8 mm. wide, scabrous on both sides; panicle 1-2 dm. long, more or less interrupted; empty glumes scabrous on the keel, 6-7 mm. long; lemma 5-6 mm. long, obtusely 2-lobed; awn borne below the apex, often obsolete. Wet meadows: Mont—Colo.—Calif.—Wash. *Submont.*—*Mont.* Je—Au.

4. *G. Shearii* (Scribn.) Rydb. Stem 5-7 dm. high, minutely pubescent at the nodes; leaf-blades 1-1.5 dm. long, 3-4 mm. wide, minutely scabrous below, smooth above; panicle 1-2 dm. long; spikelets usually 2-flowered; empty glumes acute; the first 3 mm. long, 1-nerved, lance-subulate, the second 4 mm. long; lemma about 4 mm. long, slightly 2-cleft at the apex; awn straight, 1-3 mm. long. *Trisetum argenteum* Scribn. *T. Shearii* Scribn. Among rocks: Colo. *Mont.* Au.

36. AVÈNA (Tourn.) L. OATS.

Annuals or perennials. Inflorescence a contracted or open panicle. Spikelets usually large, erect or pendulous, usually 2-several-flowered, rarely 1-flowered, the rachilla articulated between the flowers, the lower flowers perfect, the upper ones often staminate or wanting. Empty glumes 2, membranous, exceeding or shorter than the lemma, persistent. Lemma 5-9-nerved, rounded on the back, the apex frequently shortly 2-toothed, bearing a dorsal twisted and geniculate awn, the upper empty ones or those enclosing staminate flowers awnless. Palea 2-cleft or 2-toothed, narrow. Styles distinct. Grain deeply furrowed, usually pubescent.

Perennials, with rootstocks, empty glumes 5-12 mm. long, lemma hairy at the base.

Empty glumes shorter than the flowers; panicle lax, narrow, and somewhat nodding; plant not tufted.

1 *A. striata*.

1. *S. pectinata* Bosc. Stem 1-2 m. high, glabrous, stout; leaf-blades 3-6 dm. long, 6-15 mm. wide, scabrous on the margin, usually flat, becoming involute; spikes 5-30, often short-peduncled, 5-12 cm. long; rachis rough on the margins; spikelets 12-14 mm. long; first empty glume equalling the lemma. *S. cynosuroides* A Gray, not Willd. *S. Michauxiana* Hitchc. In swamps and streams: N.S.—N.J.—Tex.—Colo.—Ore.—Mack. Plain—Submont. Au—O.

2. *S. gracilis* Trin. Stem 3-10 dm. high, glabrous; leaf-blades 2-4 dm. long, 2-6 mm. wide, flat or involute; spikes 4-8, appressed, usually short-stalked, 3-5 cm. long; spikelets 6-8 mm. long, first glume half as long as the second and the lemma. Saline soil: B.C.—Calif.—Ariz.—Kans.—Sask. Plain—Submont. Au—S.

40. BECKMANNIA Host. SLOUGH GRASS.

Tall grasses with flat leaf-blades. Spikelets 1-2-flowered, orbicular, compressed, in two rows on several erect spikes. Empty glumes 2, membranous, sacate, obtuse or abruptly acute. Lemma narrow, thin-membranous. Palet hyaline, 2-keeled. Styles distinct; stigmas plumose. Grain oblong, free.

1. *B. eruciformis* (L.) Host. Stem 4-10 dm. high, glabrous, simple; leaf-blades 7-20 cm. long, 4-8 mm. wide, scabrous; panicle simple or compound; spikes 1-2 cm. long; spikelets 2-3 mm. long, 1-2-flowered; empty glumes sacate, abruptly acute; lemma acute or awn-pointed. Wet ground: Yukon—Calif.—N.M.—Ia—Ont. Plain—Mont. Jl—S.

41. SCHEDONNARDUS Steud.

Annuals, with involute, subulate leaf-blades. Spikelets 1-flowered, acuminate, sessile, alternate on opposite sides of the long rachis, forming several long, slender spikes. Empty glumes 2, persistent, narrow, acuminate, somewhat unequal. Lemma longer, rigid, enclosing the narrow shorter palet. Styles distinct; stigmas plumose.

1. *S. paniculatus* (Nutt.) Trelease. Annual; branched at the base; stems 2-5 dm. high, scabrous; leaf-blades 2-5 cm. long, 1-2 mm. wide, flat, stiff; spikelets nearly 3 mm. long, sessile and appressed; empty glumes hispid on the keel, the second much longer than the first and nearly equalling the lemma. *S. texanus* Steud. Sandy soil, especially river banks. Man—Ill.—Tex.—N.M.—Sask. Plain—Submont. Jl—S.

42. CHLORIS Sw.

Usually perennials. Spikelets 1-flowered, often sessile, with 1 or more empty usually awned glumes above the perfect flower, crowded in 2 rows, in verticillate or approximate spikes, the rachilla prolonged beyond the flower. Empty glumes 2, persistent, unequal, keeled, narrow, acute or acuminate, awnless or awn-pointed. Lemma acute, usually long-awned, rarely nearly awnless. Palet folded, 2-keeled. Styles distinct, stigmas plumose.

1. *C. brevispica* Nash. Perennial; stem 1-3 dm. high; leaf-blades 1-6 cm. long, 1-3 mm. wide, scabrous above and on the margins; spikes 6-10, finally spreading, 2.5-4.5 cm. long; spikelets (exclusive of the awns) about 2.8 mm. long, empty glumes lanceolate, acute; lemma 2.5 mm. long; awn about 2 mm. long; the fourth glume (second lemma) empty, about 1.5 mm. long, with an awn of about the same length. Sandy soil: Tex.—e Colo.—N.M. Son. Jl—Au.

43. BOUTELOUA Lag. GRAMA, GRAMA GRASS, MESQUITE GRASS, BUFFALO GRASS

Perennials or annuals, mostly tufted. Spikelets few or numerous, 1- or 2-flowered, crowded in 2 rows and forming few to many one-sided, more or less curved sessile spikes; rachis usually conspicuously prolonged beyond the spikelets. Lower flowers perfect; the upper when present staminate. Empty glumes 2, narrow, acute, unequal, keeled. Lemma usually thinner and broader, 3-nerved, the nerves excurrent. Lemma of the upper 1-3 imperfect flowers borne at the end of a rachilla, 3-awned. Styles distinct; stigmas plumose.

Spikes 1-4, rarely more, spikelets 25 or more

Spikes usually more than one.

Awns manifestly arising from between the lobes of the lemma; annual.

1. *B. polystachya*.

Awns terminating the lobes of the lemma, caespitose tufted perennials.

2. *B. eriopoda*.

Stem densely villous below

Stem glabrous

Rachilla bearing the rudimentary glumes and awns glabrous; second glume strongly papillose-hispid on the keel

3. *B. hirsuta*.

Rachilla bearing the rudimentary glumes and awns with a tuft of long hairs at the apex, second glume scabrous and sparingly long-ciliate on the keel

4. *B. gracilis*

5. *B. procumbens*

6. *B. curtispindula*.

Spike solitary, tufted annual

Spikes 12 or more; spikelets in each few, less than 12

1. *B. polystachya* (Benth.) Torr. Caespitose annual; stem geniculate, ascending, 1-3 dm. high; leaf-blades 1-5 cm. long, 1-2 mm. wide, flat, scabrous, ciliate with a few hairs; spikes 4-8, about 2 cm. long; spikelets 1.5-2.5 mm. long; first glume very small, the second shorter than the lemma, purplish; awns not more than half as long as the glumes. SIX-WEEK GRAMA. River valleys and sandy soil: Tex.—Colo.—Utah—Calif.; Mex. Son.

2. *B. eriopoda* Torr. Stems 3-6 dm. high, densely villous at least below; sheaths glabrous; leaf-blades 5-15 cm. long, 1-2 mm. wide; spikes 2-5, erect on short woolly pedicels, 2-5 cm. long; spikelets 2-flowered, 6-8 mm. long exclusive of the awns; empty glumes glabrous. BLACK GRAMA. Dry soil: Tex.—Colo.—Utah—Calif.; Mex. Je-O.

3. *B. hirsuta* Lag. Stem 1-5 dm. high, glabrous; leaf-blades 2-12 cm. long, 2 mm. wide or less, flat, rough, sparingly papillose-hirsute near the base; spikes 1-4, 1-5 cm. long, the rachis conspicuously prolonged beyond the spikelets; spikelets numerous, 5-6 mm. long; lemma 3-cleft to near the middle. HAIRY GRAMA. Dry or sandy soil: Minn.—Ill.—Tex.—Ariz.—S.D.; Fla.; Mex. Plain—Submont. Je—Au.

4. *B. gracilis* (H.B.K.) Lag. Stem 1.5-4 dm. high, smooth and glabrous; leaf-blades 3-10 cm. long, 2 mm. wide or less, flat or when dry involute, usually glabrous, spikes 1-3, often strongly curved, 2-5 cm. long; spikelets numerous, about 6 mm. long; first glume about half as long as the second. *B. oligostachya* (Nutt.) Torr. BLUE GRAMA. Plains and prairies. Man.—Wisc.—Miss.—Ariz.—Alta.; Mex. Plain—Submont.

5. *B. procumbens* (Durand) Griffiths. Stems prostrate or ascending, 1-3 dm. high; leaf-blades 2-5 cm. long; spikes solitary, 1-3 cm. long; spikelets 4-5 mm. long; first empty glume half as long as the second one; lemma pubescent on the veins, 3-lobed, the middle lobe 2-toothed; middle awn equalling the glumes and twice as long as the lateral ones. *B. prostrata* Lag. SIX-WEEK GRAMA. Sandy plains: Tex.—Colo.—Ariz.; Mex. Son.—Submont. Jl-D.

6. *B. curtispindula* (Michx.) Torr. Perennial, with more or less caespitose rootstocks; stem 3-10 dm. high, smooth and glabrous; leaves 5-15 cm. long, 2-4 mm. wide, scabrous above; spikes many, 6-15 mm. long, spreading or reflexed; spikelets 4-12, divergent, 7-10 mm. long; empty glumes scabrous especially on the keel, lemma 3-toothed at the apex. *B. racemosa* Lag. *Atheropogon curtispindulum* Fourn. TALL GRAMA. Dry soil: Ont.—N.J.—Tex.—Ariz.—Sask.; Mex. Plain—Submont. Jl-S.

44. LEPTOCHLOA Beauv.

Annuals or perennials. Spikelets small, usually close, 2-several-flowered, rarely 1-flowered, flattened, sessile, in two rows, forming many long slender spikes. Empty glumes 2, keeled, a little unequal, usually shorter than the spikelets. Styles distinct; stigmas plumose.

1. *L. filiformis* (Lam.) Beauv. Annual, branched at the base; stems 3-10 dm. high, erect, glabrous; leaf-blades 5-20 cm. long, 2-6 mm. wide, scabrous; panicle 1-4 dm. long; spikes numerous, slender, ascending or spreading, the lower 5-15 cm. long; spikelets usually 3-flowered, 2 mm. long; lemma 2-toothed at the apex, ciliate on the nerves. *L. mucronata* (Michx.) Kunth. Dry soil: Fla.—Va.—Ill.—N.M.—Calif.; Mex., W. Ind. Son. Jl-S.

45. BULBILIS Raf. BUFFALO GRASS.

Creeping, stoloniferous, dioecious perennials. Staminate spikelets 2- or 3-flowered, crowded in 2 rows on one side of the short, flattened rachis, in small spikes. Empty glumes 2, membranous, lanceolate. Lemma similar. Pistillate spikelet 1-flowered. First empty glume membranous, usually small, the second largest, firm, concave at the base, 3-lobed at the apex. Lemma narrow, nearly hyaline, enclosing a broad, 2-nerved, convolute palea. Styles distinct, long; stigmas elongate, short-plumose.

1. *B. dactyloides* (Nutt.) Raf. Stoloniferous perennial; stems bearing the staminate flowers 1-3 dm. high, erect, exceeding the leaves, glabrous; those bearing the pistillate flowers 1-10 cm. long, shorter than the leaves, leaves 2-10 cm. long, 1-2 mm. wide, papillose-hirsute; staminate spikelets 2 or 3, approximate, 0.5-1.5 cm. long; spikelets 4-5 mm. long, flattened, 2-3-flowered; pistillate spikelets in the axils of the leaves, ovoid, the empty glumes indurate. *Buchloe dactyloides* (Nutt.) Engelm. Plains and prairies. Minn.—Ark.—Tex.—N.M.—N.D.; Mex. *Plain—Submont.* Je-Jl.

46. SCLEROPOGON Philippi.

Dioecious perennial herbs with tufted rootstocks. Spikelets in narrow panicles, very unlike. Staminate spikelets compressed, linear, many-flowered, empty glumes nearly equal, lanceolate; lemma 3-toothed at the apex or entire, about equalling the glumes and the palea. Pistillate spikelets cylindrical, 3-5-flowered; glumes lanceolate, the upper larger; lemma cylindrical, rigid, enveloping the palea, 3-lobed and 3-awned.

1. *S. Karwinskyanus* (Fourn.) Benth. Stems ascending, 1-3 dm. high, glabrous; leaf-blades firm, flat, 1-4 cm. long, 1-2 mm. wide; inflorescence spike-like; staminate spikelets 2-5 cm. long, 7-25-flowered; empty glumes 7-8 mm. long; lemma almost as long, slightly 3-toothed at the apex and awn-pointed, pistillate spikelets few-flowered, empty glumes very unequal, 7-14 mm. long; lemma about 1 cm. long, with three awns often 5-6 cm. long. Dry plains. Tex.—Colo.—Ariz.—Mex. *Son.* My-O.

47. PHRAGMITES Trin. REED, CANE-GRASS.

Tall perennials with long creeping rootstocks. Leaves broad and flat. Spikelets numerous in large terminal panicles, 3-several-flowered, the lower flower staminate, the rest perfect; rachilla articulated between the flowers and covered with long hairs. Empty glumes keeled, narrow, acute, the first much shorter than the second. Lemma similar, long-acuminate, 3-nerved. Palea hyaline, much shorter, 2-keeled. Styles short; stigmas plumose.

1. *P. phragmites* (L.) Karst. Stem glabrous, 1.5-5 m. high, stout; leaf-blades 1.5-4 dm. long, 8-50 mm. wide, flat, glabrous; panicle 1.5-3 dm. long, ample; spikelets numerous; lemma 10-12 mm. long, long-acuminate. *F. communis* Trin. Swamps. Newf.—Fla.—Calif.—B.C.; Mex., W. Ind., Eurasia. *Plain—Submont.* Au-O.

48. MUNROA Torr. FALSE BUFFALO GRASS.

Low prostrate herbs, dichotomously branched and fasciculate at the nodes. Leaves short, rigid, crowded at the nodes and at the ends of the branches. Spikelets few, almost sessile in the axils of the leaves and almost concealed in the leaf-rosettes. Empty glumes hyaline, nerveless, acute. Lemmas larger, 3-nerved, retuse or 3-toothed at the apex, the upper one or two often sterile. Palea hyaline. Stamens 3. Styles elongated; stigmas barbellate or short-plumose. Grain free.

1. *M. squarrosa* (Nutt.) Torr. Stems 1-2 dm. long; sheath short and inflated, long-hairy at the throat, leaf-blades 1-2.5 cm. long, 1-2 mm. wide, rigid, spreading, scabrous, pungent; spikelets 2-5-flowered; empty glumes shorter than the lemma, which is about 5 mm. long, 3-toothed and awn-pointed. Dry plains: Sask.—S.D.—Tex.—Ariz.—Alta. *Plain—Submont.* Au-O.

49. BLEPHARIDACHNE Hack.

Low branched perennials or biennials, with crowded involute leaves. Spikelets few in subcapitate panicles, 4-flowered, the two lower flowers neutral, the uppermost reduced to a stipitate villous 3-cleft awn. Empty glumes membranous, carinate, 1-nerved, acute, glabrous, the first somewhat shorter. Lemma 3-nerved, villous on the nerves, 3-lobed, with the middle lobe longest, lobes in the neutral flowers obtuse, in the perfect ones attenuate. Palea shorter, 2-keeled, 2-nerved, 2-toothed at the apex, imperfectly developed in the neutral flowers. Stamens 2. Styles 2; stigmas elongated, minutely hairy. Grain free. [*Eremochloa* S. Wats., not *Eremochloa* Buese.]

1. **B. Kingii** (S. Wats.) Hack. Stems 3-7 cm. high, glabrous; leaf-blades 1-2 cm. long, rigid, revolute-setaceous, pungent; empty glumes 7 mm. long, acuminate, purplish; lemma of the neutral flowers 4 mm. long, very villous at the base; that of the perfect flower glabrous at the base, awned; rudiment 3-awned. Dry barren foot-hills Nev.—Utah—Ariz. Son. My.

50. TRIPLÄSIS Beauv. SAND-GRASS.

Tufted perennials. Panicles in our species narrow. Spikelet short-pedicellate, 2-6-flowered, the flowers perfect or the uppermost staminate, the rachis glabrous, articulate between the flowers. Empty glumes keeled, 3-nerved, shorter than the lemma. Lemma dorsally rounded at the base, 3-nerved, deeply 2-lobed at the apex, with an awn arising between the lobes. Palea shorter, with 2 ciliate keels, compressed. Styles short; stigmas plumose.

1. **T. purpurea** (Walt.) Chapm. Tufted perennial (?); stem 3-10 dm. high, erect, prostrate or decumbent, branched below; leaf-blades 1-6 cm. long, 2 mm. wide, rigid, scabrous, sparsely ciliate; panicle 2-7 cm. long; spikelets 2-5-flowered, 5-8 mm. long; lemma oblong, 2-lobed at the apex, with erose-truncate lobes, midvein excurrent in a short point. Sandy places: Me.—Fla.—Tex.—N.M.—Neb. Plain. Au-S.

51. DASYÓCHLOA Willd.

Stoloniferous perennials. Inflorescence densely paniculate. Spikelets flat, 5-10-flowered; flowers perfect. Empty glumes 2, membranous, ovate, nearly equal. Lemma oblong, more or less pubescent, at least on the veins, cleft to the middle, with an awn between the lobes, 3-nerved. Palea broad, prominently 2-keeled. Styles short, distinct; stigmas plumose.

1. **D. pulchella** (H.B.K.) Willd. Densely tufted; stem 3-10 cm. high, fasciculately branched; leaf-blades 1-3 cm. long, about 1 mm. wide, involute, striate, curved, scabrous; inflorescence small and compact; spikelets 5-10-flowered, 5-8 mm. long, empty glumes white, lanceolate, 5-7 mm. long, acuminate; lemma 4-6 mm. long, oblong, cleft to the middle. *Triodia pulchella* H.B.K. Hills and plains. Tex.—w Wyo.—Calif., Mex. Son. Ap-O.

52. ERIONEÛRON Nash.

Tufted, low perennials. Panicles small, dense, subcapitate. Leaves thick, with thickened white margins. Spikelets several-flowered. Empty glumes narrow, acuminate. Lemma broad, 3-nerved, pubescent on the nerves below, with long silky white hairs, acuminate at the apex, entire or slightly 2-toothed, the terminal awn rising between the minute teeth. Style short.

1. **E. pilosum** (Buckley) Nash. Stem 0.5-3 dm. high, leafy mostly at the base, leaf-sheath pilose-ciliate at the summit; blades erect, thick, folded, papillose-ciliate, 2-8 cm. long; spikelets 3-8, crowded, 1-1.5 cm. long; lemma 5.5-6 mm. long, acuminate, entire or slightly toothed at the apex; awn 1-1.5 mm. long. *Tricusps acuminata* Munro. *Triodia acuminata* Vasey. Dry gravelly or sandy soil. Kans.—Nev.—Ariz.—Tex. Son.—Submont. Ap-O.

53. TRIDENS R. & S

Perennials with rootstocks, ours tufted. Panicles open, or in ours narrow, sometimes spike-like. Spikelets 3-many-flowered, the flowers perfect, or the

upper one staminate. Empty glumes keeled, usually shorter than the lemma. Lemma 3-nerved, pilose on the nerves and the margins, entire or 2-toothed at the apex. Palet shorter, 2-keeled. Styles short; stigmas plumose.

Second empty glume 1-nerved.
Second empty glume 3-5-nerved.

1. *T. muticus*
2. *T. elongatus*.

1. ***T. muticus*** (Torr) Nash. Stem 2-5 dm. tall, glabrous; leaf-blades 2-12 cm. long, 2-3 mm. wide, usually involute when dry, scabrous; panicle narrow, 6-15 cm. long; spikelets 6-9-flowered, 10-12 mm. long; lemma 4-5 mm. long, obscurely and irregularly lobed at the obtuse or rounded apex, not mucronate. Hills: Tex.—Colo.—Ariz.; Mex. Son. Je-O.

2. ***T. elongatus*** (Buckley) Nash. Stem 3-10 dm. tall, scabrous; leaf-blades erect or ascending, 4-25 cm. long, 2-3 mm. wide, long-acuminate, scabrous; panicle narrow, 12-25 cm. long; spikelets 8-10-flowered, 10-14 mm. long; lemma 5-6 mm. long, obtuse or minutely 2-toothed, mucronate. Plains: Mo.—Colo.—Ariz.—Tex. Austral—Son. Je-N.

54. **DIPLACHNE** Beauv.

Tall tufted perennials. Panicles composed of several long spike-like or raceme-like branches. Spikelets linear, sessile or nearly so, the flowers perfect or the uppermost staminate. Empty glumes persistent, keeled, acute, unequal. Lemma larger, 2-toothed and mucronate or short-awned between the teeth. Palet hyaline, 2-nerved and 2-keeled. Styles distinct; stigmas plumose.

1. ***D. acuminata*** Nash. Tufted perennial; stem 3-6 dm. high; leaf-blades erect, 1-3 dm. long, 3-4.5 mm. wide, scabrous; racemes numerous, erect or ascending, the longer 7-15 cm. long; spikelets 10-12 mm. long; empty glumes 8-11 mm. long; lemma 6-7 mm. long, acuminate; awn 0.75-1.33 mm. long. Wet or moist ground: Ark.—Neb.—Colo. Plain. Je-Au.

55. **REDFIELDIA** Vasey. BLOW-OUT GRASS, SAND-GRASS

Tall perennials, with long creeping sealy rootstocks. Panicles diffuse, with long capillary branches. Spikelets numerous, 1-3-flowered, the flowers perfect. Empty glumes about equal, 1-nerved. Lemma large, compressed-keeled, with a basal ring of hairs, 3-nerved, awn-pointed or acute. Palet shorter, 2-nerved. Styles long; stigmas short, plumose.

1. ***R. flexuosa*** (Thurber) Vasey. Stem 4-12 dm. high; leaf-blades 3-6 dm. long, 2-4 mm. wide, usually involute; panicle 2-5 dm. long; spikelets about 6 mm. long, 1-3-flowered, lemma scabrous, twice as long as the acute glabrous empty glumes. Sand hills. S.D.—Okla.—Colo.—Wyo. Plain. Au-S.

56. **KOELERIA** Pers JUNE GRASS.

Tufted annuals or perennials. Panicles narrow, contracted, spike-like. Spikelets numerous, crowded, 2-5-flowered, the flowers perfect or the uppermost one or two staminate, shining. Empty glumes narrow, unequal. Lemma similar to the second, the upper ones gradually smaller. Palet hyaline, 2-keeled, 2-toothed. Styles very short; stigmas plumose.

1. ***K. gracilis*** Pers. Stem 3-6 dm. high, slender, glabrous up to the inflorescence; leaf-blades narrow, 1-2 mm. wide, usually involute, glabrous or the lower short-pilose, 4-12 cm. long; panicle spike-like, 4-15 cm. long; spikelets shining, pale; empty glumes lanceolate, acute, scabrous; lemma similar, more hyaline and slightly shorter. *K. cristata*, in part. *K. nitida* Nutt. Prairies and plains: Ill.—Tex.—Calif.—B.C.; Eur. Plain—Submont. Jl-S.

57. **ERAGRÓSTIS** Beauv. STINK-GRASS, SKUNK-GRASS.

Tufted annuals or perennials, sometimes prostrate or creeping; some species dioecious. Spikelets numerous, singly or in fascicles, 2-many-flowered, the flowers perfect or unisexual. Empty glumes unequal. Lemma large, 3-nerved, usually broad. Palet shorter, prominently 2-nerved and 2-keeled, often incurved and persistent on the rachis. Stamens 2 or 3. Styles short; stigmas plumose.

- Plant extensively creeping, rooting at the nodes; plant dioecious 1 *E. hypnoides*
 Plant not creeping, not rooting at the nodes, flowers perfect
 Annuals, much branched, ascending or decumbent and geniculate at the base
 Spikelets about 3 mm. broad, first empty glume only slightly shorter than the second. 2 *E. megastachya*
 Spikelets 1.5-2 mm. broad, first empty glume only two-thirds as long as the second
 Inflorescence open; branches at last more or less spreading, spikelets dark green or lead-colored. 3 *E. Purshii*.
 Inflorescence narrow; branches erect or strongly ascending, spikelets light yellowish green 4 *E. lutescens*.
 Perennials, rigid, erect, often tufted.
 Spikelets scattered on the long branches.
 Branches of the panicle widely spreading in age 5 *E. pectinacea*.
 Branches of the panicle erect or strongly ascending
 Spikelets 3-9-flowered, on pedicels much longer. 6 *E. trichodes*
 Spikelets 8-15-flowered, on pedicels scarcely as long. 7 *E. neo-mexicana*
 Spikelets clustered on short branches. 8 *E. secundiflora*.

1. *E. hypnoides* (Lam.) B.S.P. Stem 5-45 cm. long, branched, glabrous; floral branches erect, 3-15 cm. high; leaves about 5 cm. long or less, 1-2 mm. wide, flat; spikelets 10-35-flowered, 4-15 mm. long; empty glumes unequal, the first one-half to two-thirds as long as the second; lemma about 2.5 mm. long; lateral veins prominent; glumes of the pistillate spikelets more acute than those of the staminate ones *E. reptans* Nees. Sandy or gravelly shores: Vt.—Ont.—Neb.—N.M.—Fla.—B.C.—Ida.—Calif.; Mex., W. Ind. *Plain—Submont.* Au-S.

2. *E. megastachya* (Koel.) Link. Stem 1-6 dm. tall; leaf-blades 7-18 cm. long, 2-6 mm. wide, flat, smooth beneath, scabrous above; panicles 5-15 cm. long, spikelets 8-35-flowered, 5-16 mm. long, very flat; empty glumes acute; lemma obtuse, 2-2.5 mm. long. *E. major* Host. STINK GRASS. Waste places and cultivated grounds: Ont.—Fla.—Calif.—Mont.; Mex.; nat. from Eu. *Plain—Submont.* My-S

3. *E. Purshii* Schrad. Stem 1-4 dm. tall, smooth; leaf-blades 4-9 cm. long, 1-2 mm. wide; panicle open, 7-20 cm. long; spikelets 5-15-flowered, 3-8 mm. long; lemma acute, firm, about 1.5 mm. long. Dry or sandy places. Ont.—Fla.—Ariz.; Mex. *Plain—Submont.* Je-O.

4. *E. lutescens* Scribn. Stems 1-2 dm. high, glabrous; leaf-blades 2-5 cm. long, 2-3 mm. wide, flat; panicle narrow, 4-7 cm. long; spikelets 2-3 mm. long, 3-12-flowered; first glume about 1 mm. long, the second 1.3 mm. long; lemma obtuse, about 2 mm. long, 3-nerved. Sandy banks: Wash.—Ida.—Nev. *Son.* Jl-S

5. *E. pectinacea* (Michx.) Steud. Stem 3-8 dm. high, erect, rigid, leaf-blades 1-3 dm. long, 4-8 mm. wide, flat, sparingly villous at the base; panicle 1.5-6 dm. long, purple or purplish, strongly bearded in the axils; spikelets 5-15-flowered, 3-8 mm. long; empty glumes acute, subequal; lemma 1.75-2 mm. long. Dry or sandy soil: N.H.—Fla.—Tex.—N.M.—S.D. *Plain.* Au-S.

6. *E. trichodes* (Nutt.) Nash. Stem 6-12 dm. high; sheaths pilose at the throat; leaf-blades 1.5-7 dm. long, 2-4 mm. wide; panicle 2-7 dm. long, narrow; lower axils sometimes bearded; spikelets usually pale, 3-9-flowered, 5-9 mm. long, empty glumes subequal; lemma acute, 2-3 mm. long. Sandy soil: Ohio—Ark—Tex.—N.M.—Neb. *Plain—Son.*

7. *E. neomexicana* Vasey. Stem 4-8 dm. high, usually branching near the base; leaf-blades flat, 4-10 mm. broad; panicle oblong, 2-4 dm. long, open; spikelets 5-8 mm. long, 8-15-flowered; lemma hispidulous on the keel near the acute apex; palea one-third shorter, ciliate. (?) *E. limbata* Fourn. (older name). Mountain sides. w Tex.—s Utah—Calif.; n Mex. *Son.* Je-S.

8. *E. secundiflora* Presl. Stems 1.5-10 dm. high, erect, simple; leaf-blades 5-30 cm. long, 2-4 mm. wide, flat; panicle 4-15 cm. long, the branches erect or ascending; spikelets crowded, sessile or nearly so, strongly flattened, 8-40-flowered, 6-20 mm. long, 3-5 mm. wide; empty glumes acute, equal; flowering glumes 3-3.5 mm. long, acute, usually purple-margined. Dry or sandy soil: Mo—La.—Tex.—N.M.—Colo.; Mex. *Son.* Au-S.

58. CATABRÔSA Beauv. BROOK-GRASS.

Creeping or floating aquatic perennial. Panicles open, with slender spreading or reflexed branches. Spikelets 2- (rarely 3- or 4-) flowered, with the rachilla articulate between the flowers. Empty glumes unequal, broad, thin, very obtuse. Lemina strongly 3-nerved, longer than the empty glumes. Palet 2-keeled, nearly as long. Styles distinct, stigmas plumose.

1. C. aquatica (L.) Beauv. Stem 1-3 dm. high, bright green, flaccid; leaf-blades 3-12 cm. long, 2-6 mm. wide, flat, obtuse; panicle 3-20 cm. long, open; branches whorled; spikelets 2.5-3.5 mm. long; first glume about 1 mm., the second nearly 2 mm. long; lemma 2-2.5 mm. long, 3-nerved, cross-truncate at the apex. In water: Lab.—Que.—Colo.—Utah—Alaska, Eurasia. *Submont.*—*Subalp.* Je—Au.

59. SPHENOPHOLIS Scribn.

Tall tufted perennials. Panicles usually narrow. Spikelets numerous, 2-3 flowered, shining. First empty glume narrow, 1-nerved, acuminate, the second much broader, obovate when spread, obtuse or truncate, 3-nerved. Lemma narrower than the second glume, obtuse or acute. Palet narrow, 2-nerved. Styles short; stigmas plumose. [*Eatonia* Raf.]

Second empty glume much wider than the lemma, rounded or truncate and somewhat cucullate at the apex.

Intermediate nerves of the second glume almost as prominent as the lateral ones, leaf-blades firm, much broader than the sheaths and therefore with prominent auricles.

Intermediate nerves of the second glume faint, the lateral ones strong, leaf-blades soft, not much wider than the sheaths, auricles not prominent.

Second empty glume oblanceolate, not much wider than the lemma, obtuse or acute.

Second empty glume rather firm, as well as the lemma obtusish.

Second empty glume thin and with a broad, scarious margin, acutish, lemma acute.

1 *S. robusta*
2 *S. obtusata*
3 *S. intermedia*
4 *S. pallens*

1. S. robusta (Vasey) Heller. Stem 4-10 dm. high, erect, glabrous; leaf-blades firm, dark green, 1-3 dm. long, 4-8 mm. wide, scabrous; panicle dense, usually decidedly lobed; spikelets 2.5-3 mm. long; first glume linear-subulate, about 1.5 mm. long, the second cuneate, about 2 mm. long, firm, very scabrous; lemma about 2 mm. long, obtuse. *Eatonia robusta* Rydb. River banks: Neb.—N.M.—Ariz.—Wash. *Plain.* My—Jl.

2. S. obtusata (Michx.) Scribn. Stem 3-7 dm. high, erect, glabrous, leaf-blades 3-20 cm. long, 2-5 mm. wide, scabrous; panicle 5-15 cm. long, dense and spike-like, strict, spikelets crowded, 2.5-3 mm. long; first glume linear-subulate, the second cuneate, 1.5 mm. long and about as broad; lemma 1.5-2 mm. long, obtuse. *E. obtusata* A. Gray. Prairies, meadows and valleys: Mass.—Fla.—Ariz.—Mont.; Mex. *Plain—Submont.* Ap—Au.

3. S. intermedia Rydb. Stem 6-8 dm. high, striate, shining; leaf-blades 8-15 cm. long, 3-5 mm. wide, usually flat; inflorescence rather narrow and dense; first empty glume about 2 mm. long, subulate, scabrous on the back. *E. intermedia* Rydb. Meadows: Sask.—N.M.—Wash. *Plain—Submont.* Jl—S

4. S. pallens (Spreng.) Scribn. Stem glabrous, 3-10 dm. high; leaf-blades 5-15 cm. long, 2-6 mm. wide, scabrous; panicle 7-20 cm. long, usually nodding, lax; spikelets 3-3.5 mm. long; first empty glume subulate, slightly shorter than the second; lemma lanceolate, acute, about 3 mm. long. *E. pennsylvanica* A. Gray. Open woods and among bushes: N.B.—Ga.—N.M.—B.C. *Plain—Submont.* Je—Au.

60. MELICA L. MELIC-GRASS.

Perennials with rootstocks, the stem often bulbous at the base. Panicles in our species narrow, often raceme-like. Spikelets rather few, erect or nodding, 1-several-flowered, the lower flowers perfect, sometimes 1 or 2 staminate, and the upper neutral. Empty glumes membranous or hyaline, unequal in length. Lemma larger, membranous, the lateral nerves vanishing in the broad hyaline margins; upper empty lemmas gradually smaller, convolute and enclosing each other, forming an obovate or clavate mass. Palet shorter than the lemma, 2-keeled. Styles distinct; stigmas plumose.

Lemma notched at the apex, awned.

Lemma neither notched nor awned

Lemma attenuate at the apex

First empty glume 4 mm. long, second 5-6 mm. long.

First empty glume 6 mm. long, second about 8 mm. long

Lemma obtuse

Stem bulbous at the base

Panicle narrow, lemma 7-8 mm. long.

Spikelets usually nodding, flattened, second empty glume shorter than the first flower

Spikelets erect, terete, second empty glume as long as the first flower.

Panicle open; lemma 6 mm. long

Stem not bulbous at the base

1. *M. Smithii*.

2. *M. subulata*.

3. *M. Pammelii*.

4. *M. spectabilis*.

5. *M. bella*.

6. *M. Macbridei*.

7. *M. Porteri*.

1. ***M. Smithii*** (Porter) Vasey. Perennial with a rootstock; stem 7-12 dm. high, scabrous, leaf-blades 1-2 dm. long, 6-12 mm. wide, scabrous; panicle 1-3 dm. long, its branches at last spreading or reflexed; spikelets 3-6-flowered; first empty glume 4-6 mm. long, obscurely 3-nerved; second glume 6-8 mm. long, 5-nerved, lemma about 10 mm. long, strongly nerved, awn 3-5 mm. long. *M. retrofracta* Suksd. Damp shady places: Mich.—Wyo.—Ore.—Wash. Mont. J1-Au

2. ***M. subulata*** (Griseb.) Scribn. Stem with a bulbous base, 5-10 dm. high, smooth; leaf-blades 1-2 dm. long, 5-12 mm. broad, scabrous; panicle narrow, the erect pedicels swollen just below the spikelets; spikelets 5-6-flowered; empty glumes acute, scabrous on the keel and ciliate at the apex; lemma about 12 mm. long, with scattered hairs below, attenuate. Woods: n Calif.—Mont—Alta.—Alaska. Mont. My-Au.

3. ***M. Pammelii*** Scribn. Stem with tuberous base, 5-10 dm. high; leaves flat, 1-3 dm. long; panicle flexuose, with erect branches, scabrous; spikelets 3-6-flowered, lanceolate or oblong; empty glumes obtuse or acutish; lemma 9-10 mm. long, 9-nerved, lanceolate, acuminate, broadly scarious-margined; palea densely ciliate, fringed along the nerves. Parks: Wyo. Submont. J1

4. ***M. spectabilis*** Scribn. Stem 3-9 dm. high; leaf-blades 1-2 dm. long, 2-5 mm. wide, scabrous; panicle narrow; spikelets 10-12 mm. long, 5-7-flowered, usually purple; lower empty glume 5 mm. long, the upper 6-7 mm. long, acutish; lemma 7-8 mm. long, minutely scabrous. *M. scabrata* Piper & Beattie. Hill-sides and meadows. B.C.—Ore.—Colo.—Mont. Submont.—Mont. Je-Au.

5. ***M. bella*** Piper. Stem 4-6 dm. high, simple; leaf-blades 1-3 dm. long, 3-5 mm. wide, scabrous above; panicle narrow; spikelets 10-15 mm. long, 6-9-flowered; empty glumes obtuse, the first 6 mm. long, the second about 8 mm. long; lemma about as long, obtuse. *M. bulbosa* Geyer. Meadows and hill-sides: Wash.—Ore.—Utah—Colo.—Alta. Submont.—Mont. My-Au.

6. ***M. Macbridei*** Rowland. Stem slender, 2-5 dm. high, as well as the sheaths hispidulous-scabrous; leaf-blades 1-4 mm. wide, flat; panicle open; rays 1-3 at each node, some sessile, others peduncled and reflexed; spikelets 2-5-flowered, 7-13 mm. long, first glume 4 mm. long, 3-nerved; second glume 6 mm. long, 5-nerved; lemma 6 mm. long, thick, scabrous, obtusely 2-fid. Dry slopes: Ida. Je.

7. ***M. Porteri*** Scribn. Perennial, with a rootstock; stem 4-7 dm. high, smooth, leaf-blades 1-2 dm. long, 2-5 mm. wide, scabrous; panicle narrow, 12-15 cm. long; spikelets 4-5-flowered, nodding, 10-13 mm. long; empty glumes obtuse or acutish, the first about 3 mm., the second 5 mm. long; lemma 3-5 mm. long, scabrous. *M. parviflora* (Porter) Scribn. Plains and hills: Tex.—Kans.—Colo.—Ariz. Submont.—Mont. Je-S.

61. *DACTYLIS* L. ORCHARD-GRASS.

Tall perennials, with creeping rootstocks. Panicles contracted, with the spikelets crowded at the ends of the branches in unilateral head-like clusters. Spikelets 3-5-flowered, the flowers perfect or the uppermost staminate. Empty glumes unequal, 1-3-nerved, mucronate, the second the larger. Lemma more rigid, ciliate on the keel, mucronate or short-awned. Palea nearly as long, 2-keeled. Styles distinct; stigmas plumose.

nearly 2 mm. long; lemma 2.5–3 mm. long, the nerves pilose below. Waste places and cultivated ground. Lab.—Ga.—Calif.—B.C.; Mex.; nat. from Eu. *Plain—Mont.* My-O.

2. *P. Bigelovii* Vasey & Scribn. Annual, usually more or less tufted; ligules lanceolate, 3 mm. long; leaf-blades flat, flaccid, 5–10 cm. long, 2–4 mm. wide; panicle 5–15 cm. long, narrow; spikelets 4–6 mm. long, compressed; empty glumes glabrous, lanceolate, acute, nearly as long as the lemma; lemma 3–4 mm. long, subacute, villous on the midrib and marginal nerves; cobweb scant. Arid regions: Tex.—Colo.—Utah—Calif—L Calif *Son.—Submont.*

3. *P. pratensis* L. Stem 3–12 dm. high, smooth, leaf-blades 1–6 mm. wide, those of the stem 5–15 cm. long, the basal ones longer; panicle 5–20 cm. long, ovate or conical; spikelets 3–6-flowered, 4–5 mm. long; midvein and marginal veins of the lemma silky below, the intermediate ones glabrous. Meadows, fields and woods: Greenl.—Fla.—Calif.—Alaska; Eurasia. *Plain—Subalp.* Je-Au.

4. *P. rhizomata* Hitchc. Perennial, with a creeping rootstock; stem 3–6 dm. high, smooth; sheaths smooth, the lower loose and papery; ligules 2–3 mm. long; blades mostly flat, 1–2 mm. wide, 3–7 cm. long; panicle 3–5 cm. long; spikelets 3–4-flowered; first glume 3 mm. long, the second 4 mm. long; lemma 5 mm. long, acutish, copiously webbed at the base; keel and marginal nerves short-pilose below; internerves sparingly scabrous. Damp woods: Calif.—Ida. Ap-Je.

5. *P. occidentalis* Vasey. Stem 3–10 dm. high; sheaths flattened, scabrous; leaf-blades 5–15 cm. long, flat, 2–6 mm. wide, scabrous; panicle large, 1.5–3 dm. long, loose; spikelets 2–4-flowered, 4–6 mm. long, light green; empty glumes acute, scarious margined, unequal; lemma 3–4 mm. long, slightly pubescent below and on the keel; cobweb scant. *P. platyphylla* Nash & Rydb. Rich hillsides: N.M.—Colo.—Utah. *Submont.—Subalp.* My-Au.

6. *P. callida* Rydb. Stem 3–5 dm. high, somewhat flexuose; leaf-blades flat, flaccid, 5–12 cm. long, about 3 mm. wide; panicle open, 1–1.5 dm. long, spikelets about 3 mm. long, 2- or 3-flowered, light green; first empty glume subulate, 2 mm. long, the second slightly broader, 2.5 mm. long, glabrous; lemma 3 mm. long, glabrous except the keel, which is slightly silky below; cobweb scant but long. Warm springs: Mont. Jl.

7. *P. lanata* Scribn. & Merr. Perennial, with a creeping rootstock; stem 2.5–4 dm. high; sheath loose, the lower marcescent, scabrous; ligule 4 mm. long, obtuse; blades 2–4 mm. wide, conduplicate or involute; inflorescence open; branches in pairs, 2–3 cm. long, with 1–3 spikelets near the ends; spikelets 3–6-flowered; lemma purple, 6–7 mm. long. Subarctic situations: Alaska—B.C. *Subarct.*

8. *P. cenisia* All. Stem 1–3 dm. high, slender, ligules 1–2 mm. long, truncate; blades 2–10 cm. long, 1–2 mm. wide, involute; panicle 2–8 cm. long, open; spikelets 2–4-flowered, 5–6 mm. long, purplish; empty glumes glabrous; lemma about 4 mm. long. Arctic-alpine situations: Greenl.—Lab.—Colo.—Alaska, Eu. *Alp.* Jl-Au.

9. *P. arctica* R. Br. Stems 1–3 dm. high, smooth, erect or decumbent at the base; ligules erose-truncate; basal leaf-blades 5–10 cm. long, 2–4 mm. wide; stem-leaves shorter and often flat; panicle open, 5–10 cm. long; spikelets purple; empty glumes 3–3.5 mm. long, glabrous; lemma 4 mm. long, acute. Alpine-arctic situations: Arctic Sea—N.M.—Utah. *Alp.* Jl-Au.

10. *P. longipila* Nash. Stem 3–5 dm. high; ligules broad, obtuse or acutish; leaf-blades erect, acuminate, 3–8 cm. long, 3–4 mm. wide, flat; panicle 6–9 cm. long; spikelets 6–8 mm. long, 3–4-flowered, purple; lemma 5–6 mm. long; cobweb copious and long. Wet places: Wyo.—Mont. *Submont.*

11. *P. callichroa* Rydb. Perennial, with a horizontal rootstock, but more or less matted; stem about 3 dm. high; blades of the lower leaves 6–10 cm. long, firm, dark-green, strongly veined; blades of the upper leaves about 3 cm. long,

erect; panicle 6-9 cm. long, open; spikelets 6-8 mm. long, 5-7-flowered; empty glumes about 5 mm. long, purple with greenish or brownish margins; lemma 4-5 mm. long, lanceolate, acuminate, green below, then purple, then brown, and white and scarious above; nerves and internerves more or less villous; cobweb scant. Mountain peaks: Colo.—Wyo. *Subalp.*—*Mont.* Au.

12. *P. pudica* Rydb. Stem 2-3 dm. high; lower leaves with short loose sheaths; ligules truncate, about 2 mm. long; blades 4-5 cm. long, usually conduplicate, strongly nerved; panicle 4-8 cm. long; spikelets 4-5 mm. long, mostly 3-flowered; empty glumes strongly veined, usually purple, acuminate; lemma lanceolate, sharp-acuminate, greenish below, then purplish, and scarious at the apex. Alpine meadows: Colo. *Subalp.*—*Alp.* Au.

13. *P. reflexa* Vasey & Scribn. Stem 3-5 dm. high, slender, erect, smooth; ligules 2 mm. long, obtuse, leaf-blades 5-15 cm. long, 2-4 mm. wide; panicle 5-10 cm. long; spikelets 2-3-flowered, 3-4 mm. long, usually purple; empty glumes acuminate, smooth; lemma very acute. Wet meadows: Alta.—N.M.—Utah—Ore.—B.C. *Submont.*—*Subalp.*

14. *P. nervosa* (Hook.) Vasey. Stem 4-7 dm. high, slender, smooth; ligules truncate; blades of stem-leaves 2-7 cm. long, 2-4 mm. wide; those of the basal leaves 1.5-2.5 dm. long; panicle 5-12 cm. long, open; spikelets 3-8-flowered, flat, lax and flexuose; empty glumes linear-lanceolate, 4 mm. long; lemma linear-lanceolate, slightly scabrous on the nerves. Wet places: B.C.—Calif.—Mont. *Mont.*—*Subalp.*

15. *P. leptocoma* Trin. Stems 3-6 dm. high, smooth; ligules obtuse; leaf-blades flat, flaccid, 1-3 mm. wide, 4-10 cm. long; panicle open, 5-10 cm. long; spikelets 2-3-flowered, about 6 mm. long, green or merely tinged with purple; first empty glume about 3 mm. long, the second 3.5 mm. long; lemma linear-lanceolate, gradually acute. Boggy places: Alta.—Colo.—Wash.—Alaska. *Mont.*—*Subalp.* Jl—Au.

16. *P. alpicola* Nash. More or less tufted perennial; ligules acute, 2 mm. long, leaf-blades 3-10 cm. long, often involute or conduplicate, 1-2 mm. wide; inflorescence rather narrow, 3-5 cm. long; branches short; spikelets 5-7 mm. long, 2-4-flowered, more or less tinged with purple; empty glumes subequal, glabrous, about 3 mm. long; lemma ovate, acute, glabrous. *P. laxa* Thurber, not Haenke. Alpine: Colo—Utah—(? Ida) *Alp.* Jl—Au.

17. *P. compressa* L. Perennial, with a creeping rootstock; stem 1.5-4 dm. high, decumbent at the base, much flattened, smooth; ligules truncate; leaf-blades bluish green, stiff, erect, 2-10 cm. long, about 2 mm. wide, often convolute, scabrous above; panicle narrow, with ascending short branches, spikelet-bearing to near the base; spikelets 3-5-flowered, 3-9 mm. long; empty glumes acute, nearly equal; lemma 2-2.8 mm. long, obtuse; cobweb scant. Waste places, cultivated grounds, and woodlands. N.H.—N.C.—Calif.—B.C.—Yukon; Eurasia. *Plain*—*Mont.* Je—Jl.

18. *P. aperta* Scribn & Merr. Stem 4-5 dm. high, erect, wiry; ligules acute, leaf-blades firm, striate, minutely scabrous, glaucous, 5-15 cm. long, 2 mm. wide; panicle ovate; spikelets purplish, 5-6 mm. long, 3-4-flowered; lemma lanceolate, minutely pubescent throughout; cobweb conspicuous. Mountains. N.M.—Wyo. *Mont.*—*Subalp.* Au—S.

19. *P. macroclada* Rydb. Stem 6-8 dm. high; ligules ovate, acute; leaf-blades 7-10 cm. long, 2 mm. or less wide, flat, glabrous, firm and dark green; panicle 2-3 dm. long, open; spikelets often about 5 mm. long, lemma lanceolate, acute or acuminate, glabrous, slightly purple-tinged; cobweb scant. Mountains: Colo. *Mont.*

20. *P. triflora* Gilib. Perennial, with a creeping rootstock; stem 4-12 dm. high, erect, smooth; leaf-blades 5-15 cm. long, 2-5 mm. wide; panicle 1.5-3 dm. long, open; spikelets 3-5-flowered, 3-5 mm. long; empty glumes glabrous, scabrous on the keel; lemma obtuse, 2-3 mm. long; midnerve and lateral nerves pubescent below. *P. serotina* Ehrh. *P. flava* Auth, not L. Meadows and swampy places: Newf.—N.J.—Calif.—B.C., Eurasia. *Plain*—*Mont.* Jl—Au.

21. *P. subtrivialis* Rydb. Perennial, with a rootstock; stem slender, 4-6 dm. high, smooth; leaf-blades erect, flaccid, 8-15 cm. long, about 2 mm. wide, flat, dark green; panicle 1-2 dm. long; spikelets light green, 3-4 mm. long, 2-3-flowered; lemma 2.5 mm. long, glabrous; cobweb very scant. Meadows: Wyo.—Ida. *Mont.*

22. *P. interior* Rydb. Tufted perennial; stem slender, 3-6 dm. high; leaf-blades 2-8 cm. long, about 2 mm. wide, glabrous; panicle 4-10 cm. long; spikelets 2-5-flowered, 3-5 mm. long; lemma 2-2.5 mm. long, scabrous on the midnerve and lateral nerves. *P. nemoralis* Scribn., not L. Woods and copses: S.D.—Neb.—N.M.—Utah—Wash.—Alaska. *Plain—Mont.*

23. *P. crocata* Michx. Tufted perennial; stems strict, erect, 2-4 dm. high; leaf-blades narrow, erect, 1-2 mm. wide, 4-10 cm. long, usually involute; panicle rather narrow, 5-15 cm. long; spikelets 2-4-flowered, about 4 mm. long; lemma about as long as the glumes, pubescent on the midnerve and lateral nerves. *P. nemoralis strictior* A. Gray. Dry hills and meadows: Lab.—Vt.—Main.—Colo.—Ariz.—Alaska. *Submont.—Subalp. Je—Au.*

24. *P. alpina* L. Stem 0.5-4 cm. high, erect or decumbent at the base; ligules truncate; leaf-blades 2-8 cm. long, 2-4 mm. wide, abruptly acute, flat; panicle 2-8 cm. long; spikelets 3-5-flowered, 5-6 mm. long; empty glumes broad, glabrous, acute, scabrous on the keel; lemma about 4 mm. long, obtuse, its lower half pubescent. Alpine-arctic regions in wet places: Greenl.—Que.—Colo.—Utah—Alaska; Eu. *Mont.—Alp. Je—Au.*

25. *P. Olneyae* Piper. Stem 3-8 dm. high, glabrous, blades of the basal leaves 1-2 dm. long, often conduplicate, 2-3 mm. wide, those of the stem-leaves 3-6 cm. long, 2-3 mm. wide, flat; panicle pale green, about 1 dm. long, drooping, open; spikelets 7-10 mm. long, 4-6-flowered; lemma ovate, 5 mm. long. *P. Wheeleri* Auth., not Vasey. Pine woods and meadows: Mont.—Colo.—Ore.—B.C. *Submont.—Subalp. Jl—Au.*

26. *P. subreflexa* Rydb. Stem ascending, 5-6 dm. tall; leaf-blades flat; flaccid, 7-10 cm. long, 3-4 mm. wide, spreading; panicle open, about 1 dm. long; spikelets pale green, 6-7 mm. long, 3- or 4-flowered, lemma lanceolate, 5 mm. long. Wooded banks: Colo. *Mont.—Subalp. Jl.*

27. *P. Wheeleri* Vasey. Stem simple, 2-6 dm. high; leaf-blades 2-20 cm. long, 3 mm. wide, the lower involute or conduplicate, panicle open, 8-12 cm. long; spikelets 6-7 mm. long, 3-5-flowered, light green, rarely tinged with purple; lemma lanceolate, acute, 5 mm. long. Meadows: Alta.—Colo.—Utah—B.C. *Submont.—Subalp. Jl—Au.*

28. *P. Vaseyana* Scribn. Stem 5-7 dm. high; leaf-blades flat, 5-30 cm. long, 4-5 mm. broad; panicle open, 10-15 cm. long; spikelets often tinged with purple, 4-6-flowered, 8-10 mm. long; lemma 5.5-6.5 mm. long. Mountain meadows: Colo.—Wyo. *Mont.—Subalp. Au.*

29. *P. tricholepis* Rydb. Stem slender, 3-5 dm. high; leaf-blades 5-10 cm. long, a little over 1 mm. wide, scabrous; stem-leaves 2-6 cm. long, sometimes nearly 2 mm. wide; ligules lanceolate, acuminate; panicle 6-8 cm. long, open; spikelets 3-4-flowered, 5-8 mm. long; lemma about 4 mm. long, green, bordered with purple and a scarious border. Mountains: Colo. *Mont.—Alp. Jl—Au.*

30. *P. Tracyi* Vasey. Stem 3-8 dm. high; leaf-blades 6-12 cm. long, 2-6 mm. wide, scabrous; panicle 1-2 dm. long, spikelets 3-5-flowered, light green, loose; lemma finely strigulose-scabrous, especially on the nerves, 4-5 mm. long. *P. occidentalis* (Vasey) Rydb, not Vasey. Mountains: N.M.—Colo.—Utah. *Submont.—Subalp. Jl—Au.*

31. *P. curta* Rydb. Stem glabrous, 4-5 dm. high; leaf-blades 2-5 cm. long, 3-5 mm. wide, abruptly acute, dark green; inflorescence short, open, 4-5 cm. long; spikelets light green, strongly compressed, about 6 mm. long, 2-4-flowered; lemma lanceolate. Wooded banks: Wyo. *Mont. Jl.*

32. *P. Grayana* Vasey. Stem 5-6 dm. high, leafy; ligules triangular-lanceolate or ovate, acute; blades 1-2 dm. long, about 2 mm. wide; panicle 6-10 cm. long, open; spikelets 4-5-flowered, 6-7 mm. long; lemma lanceolate, green

at the base, purple in the middle and brownish-scarious at the top. - *P. phoenicia* Rydb. Mountains: Colo. *Alp.* Au.

33. *P. pratensisformis* Rydb. Stem 3-6 dm. high; leaf-blades flat, 2-6 mm. wide, those of the stem 2-7 cm. long, those of the sterile shoots 1.5-3 dm. long, scabrous on the margins; panicle 5-12 cm. long, spreading in anthesis only; spikelets 3-5-flowered, 6-8 mm. long; empty glumes nearly equal, acute; lemma obtuse, silky-hairy on the nerves to the middle and pubescent all over near the base. *P. pseudopratensis* Scribn. & Rydb, not Beyer. Wet places: S.D.—Kans.—Utah. *Plain—Submont.* Je-Jl.

34. *P. arida* Vasey. Stem 2-6 dm. high; leaf-blades 2-15 cm. long, erect, flat, or becoming somewhat involute, striate; panicle narrow, dense, 7-15 cm. long; branches erect; spikelets 6-7 mm. long, 5-9-flowered; lemma obtuse, scarcely compressed. *P. andina* Nutt. *P. pratericola* Rydb. Prairies and meadows: Kan.—N.M.—Utah—Wyo. *Plain—Subalp.*

35. *P. Sheldoni* Vasey. Stem rigid, 2-3 dm. high, smooth; blades of the basal leaves 5-10 cm. long, 2-3 mm. wide, rigid, flat or conduplicate; panicle narrow, 3-7 cm. long; spikelets about 6 mm. long, 3-4-flowered; lemma 4 mm. long, subobtuse, short-pubescent near the base, scarious at the apex. Dry hills: Colo.—Wyo.—Utah. *Mont.—Subalp.* Je-Jl.

36. *P. glaucifolia* Scribn. & Williams. Stem about 6 dm. high, smooth, except at the nodes; leaf-blades flat, glaucous, 1.5-2 dm. long, 2-4 mm. wide; panicle open; spikelets compressed, 3-4-flowered; empty glumes ovate, obtuse or acutish, 3-nerved, scabrous on the back, about 4 mm. long; lemma obtuse, pubescent on the keel and nerves, 3-4 mm. long. Moist banks: S.D.—Colo.—Mont. *Submont.—Mont.* Jl-Au.

37. *P. rupicola* Nash. Stems 1-3 dm. high, erect, rigid; ligules ovate, 2 mm. long; leaf-blades 1-4 cm. long, about 1 mm. wide, erect, involute; panicle 2-5 cm. long, with short ascending branches; spikelets 2-4-flowered, 3-5 mm. long, purple; lemma with midvein and lateral nerves pubescent below, otherwise glabrous or scabrous. *P. rupestris* Vasey. High mountains: Mont.—Colo.—Utah—Ore. *Mont—Alp.* Jl-Au.

38. *P. Pattersoni* Vasey. Stem 5-40 cm. high; ligules 1 mm. long, truncate; leaf-blades 1-15 cm. long, about 1 mm. wide, conduplicate or flat, smooth; panicle dense; spikelets 4-6 mm. long, 2-5-flowered, purple; lemma pubescent on the keel and lateral veins below, otherwise glabrous. *P. Grayana* Rydb. (Fl. Colo.), not Vasey, a large form. High mountains: Colo.—Wyo.—Utah. *Alp.* Jl-Au.

39. *P. Lettermani* Vasey. Stem 2-10 cm. high; ligules acute; leaf-blades mostly flat, 1-3 cm. long, 1-2 mm. wide; panicle 1-3 cm. long, dense, narrow; spikelets 3-4 mm. long, 2-4-flowered, purplish; lemma 2 mm. long, ovate, acute, obscurely nerved, glabrous. *P. Brandegei* Scribn. Alpine peaks: Colo.—Wyo. —(? Wash.) *Alp.* Au.

40. *P. Multnomae* Piper. Stems 1-4 dm. high, very slender, glabrous; ligules 1-2 mm. long; leaf-blades narrow, flat or conduplicate, 8-12 cm. long, 1-2 mm. wide; panicle loose, 5-10 cm. long, usually pale green; spikelets 5-7 mm. long, 3-5-flowered; lemma narrow, lanceolate, glabrous, slightly puberulent on the keel and marginal veins below. Cliffs: Ore.—Wash.—Mont. *Submont.* Je-Jl.

41. *P. paddensis* Williams. Stem erect, 3-5 dm. high, smooth; leaf-blades 5-8 cm. long; panicle erect, dense, oblong, 4-8 cm. long, spikelets about 8 mm. long, 3-5-flowered, purple; empty glumes broadly scarious-margined, about 4 mm. long; lemma 6 mm. long, minutely scabrous and villous at the base. *P. purpurascens* Vasey, not Sprng. *P. subpurpurea* Rydb. Mountains: B.C.—Alta.—Colo.—Wash. *Alp.* Jl-Au.

42. *P. Cusickii* Vasey. Stem smooth, erect, 3-5 dm. high; basal leaf-blades filiform, 1 mm. wide, 7-12 cm. long; those of the stem-leaves 5-7 cm. long, erect; panicle dense, oblong, 3-10 cm. long; spikelets 8-10 mm. long, 3-5-flowered;

lemma about 5 mm long, acute, scarious at the apex, finely scabrous-puberulent. Cañons: B.C.—Ida.—Ore. *Submont.*—*Mont.* My-Je.

43. *P. epilis* Scribn. Stem 4-6 dm. high; leaf-blades smooth, 2-20 cm. long, flat, or involute when dry; panicle dense, oblong, 3-7 cm. long; spikelets 3-4 flowered, about 5 mm. long; empty glumes smooth, unequal, the first 2.5 mm. long, the second 3 mm. long; lemma about 4 mm. long. Mountains: *Mont.*—*Colo.*—*Utah*—*B.C.* *Mont.*—*Alp.*

44. *P. scaberrima* Rydb. Stem 3-5 dm. high, 2- or 3-leaved, glabrous; blades of the basal leaves 8-15 cm. long, less than 1 mm. wide; those of the stem-leaves 1-5 cm. long, erect; panicle elliptic, dense, 4-7 cm. long; spikelets about 1 cm. long; empty glumes ovate, nearly equal, 4-5 mm. long, glabrous; lemma ovate, acuminate, pale, slightly tinged with purple, 5-6 mm. long, strongly 5-nerved, and conspicuously scabrous. Hills: *Ida.* *Submont.* Je.

45. *P. nematophylla* Rydb. Stem about 3 dm. high; basal leaf-blades 1-1.5 dm. long, less than 0.5 mm. wide; stem-leaves few, near the base; blades 3-5 cm. long; spikelets 7-9 mm. long; empty glumes about 4 mm. long, lanceolate, glabrous and shining; lemma about 6 mm. long, light green, with a silvery scarious margin. Mountains: *Colo.*—*Utah.* *Submont.* Je—Au.

46. *P. subaristata* Scribn. Stem 1-4 dm. high; leaf-blades 5-10 cm. long, 0.5-1 mm. wide, strongly involute, scabrous; panicle oblong, dense, 3-6 cm. long; spikelets 4-7 flowered, 6-9 mm. long, empty glumes subequal, 5 mm. long, lanceolate, 1-nerved, lemma 6 mm. long, scabrous, acuminate or even cuspidate. High mountains: *Sask.*—*Wyo.*—*Ida.*—*Alta.* *Mont.*—*Alp.* My—Au.

47. *P. idahoensis* Beal. Stems 3-6 dm. high; ligules acute; basal leaf-blades filiform, 1.5-2.5 dm. long, flaccid, involute; those of the stem-leaves 2-5 cm. long, erect; panicle loose, flexuose, 7-10 cm. long; spikelets compressed, 6-10 mm. long, loosely 5-7 flowered; empty glumes nearly equal, acute, broadly scarious-margined, about 4 mm. long; lemma scarious at the apex, minutely scabrous throughout. *P. filifolia* Vasey, not Schkuhr. *P. scabriuscula* Heller. Rocky banks: *Ida.*—*Mont.*—*Ore.* *Submont.* Ap—Je.

48. *P. gracillima* Vasey. Stems 3-5 dm. high, slender, erect; blades of the basal leaves filiform, flaccid, spreading, 5-12 cm. long; those of the stem-leaves 2-5 cm. long; panicle 5-10 cm. long, open, spikelets 6-8 mm. long, about 5-flowered, lax; empty glumes ovate-lanceolate, acute, unequal; lemma 4-5 mm. long, acute, purplish, scarious at the apex, more or less scabrous and somewhat pubescent on the keel and marginal nerves. Mountains: *B.C.*—*Calif.*—*Mont.*—*Alta.* Jl—Au.

49. *P. Vaseochloa* Scribn. Stems slender, 0.5-1.5 dm. high, 1-2-leaved; basal leaves filiform, with thickened bases; panicle 3-5 cm. long; spikelets purplish, 6-8 mm. long, 3-5 flowered; empty glumes scarious-margined, 2-3 mm. long; lemma about 4 mm. long, finely scabrous on the keel and veins. *P. pulchella* Vasey. River banks: *Wash.*—*Alta.*—*Ida.*—*Ore.* *Submont.*—*Mont.* Ap—Jl.

50. *P. longiligula* Scribn. & Williams. Stem 3-5 dm. high, with numerous persistent basal sheaths; blades of sterile shoots 1.5-2.5 dm. long, 1-2 mm. wide, flat or conduplicate; those of the stem-leaves shorter; panicle 6-12 cm. long, spikelets 4-6 flowered, 6-10 mm. long; lemma 4-5.5 mm. long, scabrous on the back, villous on the keel and marginal nerves below. Hillsides and plains: *S.D.*—*N.M.*—*Calif.*—*Ore.* *Son.*—*Subalp.* My—Jl.

51. *P. scabriuscula* Williams. Stem 2.5-3 dm. high, smooth; blades of the sterile shoots 8-12 cm. long, 1-1.5 mm. wide, flat or convolute; those of the upper stem-leaves seldom over 1 cm. long; panicle open, subpyramidal, 5-7 cm. long, 2-3.5 cm. broad; spikelets 5-7 mm. long; lemma oblong, obtuse, keeled, pale green or purplish, about 3.5 mm. long. Mountains: *Utah*—*Colo.* My—Je.

52. *P. longipedunculata* Scribn. Stem smooth, 5-7 dm. high; blades of the sterile shoots 5-20 cm. long, 1-2 mm. wide, involute; those of the stem-leaves 1-3 cm. long, scabrous; spikelets green or tinged with purple, 6 mm. long; lemma

4 mm. long, minutely scabrous. Hills and mountain sides: Wyo.—N.M.—Utah. *Son.*—*Mont.* My—Au.

53. *P. brevipaniculata* Scribn. & Williams. Stem 1-3 dm. high, smooth; leaf-blades flat or conduplicate; those of the sterile shoots 1 dm. long or more; those of the stem much shorter; panicle 3-6 cm. long, 1-2 cm. wide; spikelets green or tinged with purple, 4-6-flowered, 4-6 mm. long; second glume 3.5 mm. long, lemma obtusish or acutish, 3.5-4 mm. long. Perhaps not distinct from the next species. Dry meadows and mountain sides: Colo.—Utah—N.M.—Ariz. *Son.*—*Mont.*

54. *P. Fendleriana* (Steud.) Vasey. Stem 3-6 dm. high; leaf-blades flat or convolute, scabrous; those of the sterile shoots 1-2 dm. long, 1-2 mm. wide; panicle 5-10 cm. long, open in anthesis; spikelets 7-8 mm. long; empty glumes unequal, smooth, the second about 4 mm. long; lemma keeled, obtuse, 5 mm. long. Hills and tablelands: Colo.—N.M.—Calif. *Son.*—*Subalp.* My—Au.

55. *P. Eatonii* S. Wats. Stem 4-6 dm. high; leaf-blades flat, scabrous on both sides, those of the basal leaves 1-2 dm. long, 2-3 mm. wide, those of the cauline leaves 2 cm. long or less; panicle open, 7-8 cm. long; spikelets 5-9-flowered, obtuse 7-10 mm. long; empty glumes subequal, hispid on the keel; lemma 4-5 mm. long. Cañons: Utah—sw Colo.—Ariz. *Submont.*—*Mont.* Je.

56. *P. Canbyi* (Scribn.) Beal. Stem 5-10 dm. high, stout, smooth; leaf-blades 1-2 dm. long, 4-6 mm. wide, scabrous, flat; panicle narrow, 1-2 dm. long, spikelets 6-8 mm. long, 3-5-flowered; empty glumes unequal, acute; lemma about 4 mm. long, strongly scabrous, its summit scarious-margined and obtuse. Meadows and bogs. *Mont.*—Wyo.—Wash. *Submont.*—*Mont.* Jl—Au.

57. *P. nevadensis* Vasey. Stem 5-10 dm. high, scabrous below the panicle; blades of the basal leaves 1.5-3 dm. long, 2-3 mm. wide, scabrous; those of the stem-leaves 3-10 cm. long; panicle narrow and dense, 1-2 dm. long; spikelets 6-10 mm. long, 3-8-flowered; empty glumes scabrous, 3-4 mm. long, nearly equal; lemma very scabrous, 4 mm. long, obtuse, scarious-margined above. Plains, meadows and hillsides: *Mont.*—Colo.—Ariz.—B.C. *Submont.*—*Mont.* Ap—Au.

58. *P. Helleri* Rydb. Stem slender, 4-6 dm. high, often purple-tinged below; leaf-blades very slender, flaccid, 5-15 cm. long, 1 mm. wide; panicle rather loose, 8-10 cm. long; spikelets about 1 cm. long, 4- or 5-flowered; empty glumes linear-lanceolate, 3-nerved, glabrous, lemma linear-lanceolate, about 5 mm. long, scabrous on the upper part. Hillsides: Ida.

59. *P. laevigata* Scribn. Stem erect, smooth, 5-10 dm. high; blades of the basal leaves 1-2 dm. long, about 1 mm. wide, involute; those of the stem-leaves 2-5 cm. long; panicle narrow, 1-2 dm. long; spikelets appressed, 6-10 mm. long, about 5-flowered; empty glumes nearly equal, acute, thin, scarious-margined; lemma 4-5 mm. long, linear-oblong, the apex scarious and yellowish. *P. laevis* Vasey. Dry meadows and hillsides: *Mont.*—N.M.—B.C. *Submont.*—*Mont.*

60. *P. lucida* Vasey. Stem 3-6 dm. high, smooth; blades of basal leaves 12-15 cm. long, 1-2 mm. wide, soft; those of the stem-leaves 5-7 cm. long; panicle 1-1.5 dm. long, narrow; spikelets 6-8 mm. long, 3-4-flowered, shining, pale; empty glumes abruptly acute, unequal, 3-4 mm. long; lemma 2 mm. long, obtuse. Dry hills: Alta.—S.D.—N.M. *Submont.* Je—Jl.

61. *P. Buckleyana* Nash. Stem 2-6 dm. high, rigid, smooth; leaf-blades 2-10 cm. long, about 2 mm. wide, flat or becoming involute in drying; panicle 3-10 cm. long, narrow; spikelets 2-5-flowered, 4-6 mm. long, dark green and tinged with purple; empty glumes acute, nearly equal, scabrous on the keel; lemma 4-5 mm. long, obtuse, scabrous above, usually more or less pubescent below. *P. tenuifolia* Buckley, in part. (?) *P. wyomingensis* Scribn. Dry plains and hills: N.D.—Colo.—Utah—Wash. *Plain*—*Alp.* Je—Au.

62. *P. Sandbergii* Vasey. Stem 2-4 dm. high, very slender; ligules acute, 2-4 mm. long; basal leaf-blades 5-10 cm. long; those of the stem-leaves 1-2 cm. long; panicle 3-7 cm. long, very narrow; spikelets 2-4-flowered, about 6 mm. long, often purplish; empty glumes lanceolate, subacute; lemma linear-oblong,

obtuse, nearly 4 mm. long, puberulent, somewhat villous towards the base. *P. incurva* Scribn. & Merr. *P. tenuifolia* Buckley, in part. Plains and hills: Sask. —Wyo.—Colo.—Utah—n Calif.—B.C. *Submont.*—*Mont.* Je—Jl

63. *P. juncifolia* Scribn. Stem glabrous 1.5–3 dm. high, blades of the sterile shoots about 5 cm. long, involute; those of the stem 2–5 cm long, 1–2 mm. wide; panicle narrow; spikelets 3–5-flowered, 5–6 mm. long, empty glumes ovate, usually obtuse, subequal, 3–4 mm. long; lemma minutely scabrous on the back, 3–4 mm. long, obtuse. Plains and meadows: Wyo.—Colo.—Utah. *Plain*—*Submont* Jl—Au.

64. *P. brachyglossa* Piper. Stem glabrous, smooth, 6–10 dm high, ligules short, truncate; leaf-blades 5–20 cm long, filiform, involute; panicle narrow; 1–2 dm. long; spikelets 7–10 mm long, 3–6-flowered, empty glumes smooth, scarious-margined, 4–5 mm. long, slightly unequal; lemma obtuse, smooth or nearly so. Plains and meadows: B.C.—n Calif.—*Mont* *Son.*—*Submont.* Je—Jl

65. *P. confusa* Rydb. Stem 6–9 dm. high; basal leaf-blades 1–2 dm long, 2–3 mm. wide, flat or involute, puberulent; stem-leaves several; blades about 1 dm. long; panicle narrow, 1–1.5 dm long, dense, spikelets 7–8 mm long, usually 4-flowered; empty glumes lanceolate, shining, minutely strigulose above; lemma narrow, about 3.5 mm long, yellowish green, with brownish scarious margins Meadows and benchlands: Alta.—Neb.—Colo. *Plain*—*Mont*

66. *P. truncata* Rydb. Stem about 9 dm high, stiff; leaf-blades 1–2 dm. long, 2–3.5 mm wide, scabrous on the back; panicle about 1.5 dm. long, narrow; spikelets 3–5-flowered, 7–9 mm. long; empty glumes 5–6 mm long, tinged with purple, scabrous on the nerves; lemma narrow, about 5 mm. long, straw-colored or tinged with purple, strigulose throughout. Hills and gulches: Colo.—Alta *Submont.* Jl—Au.

67. *P. ampla* Merr. Stem 6–15 dm high; leaf-blades flat, somewhat glaucous, 15–25 cm. long, about 4 mm. wide; panicle 2–3 cm thick and 1.5–3 dm. long; spikelets 7–10 mm. long, 3–6-flowered; empty glumes lanceolate, acute, scabrous on the keel and nerves, lemma 4.5–5 mm. long, lanceolate, scabrous throughout, hispidulous on the keel. *P. larviculms* Williams. Hills and valleys: B.C.—Ore.—*Mont.*—*Ida.* *Submont.* Je—Jl.

65. SCOLÓCHLOA Link.

Tall, aquatic perennials. Inflorescence paniculate. Spikelets 2–4-flowered; flowers perfect. Empty glumes 2, thin-membranous, 3–5-nerved. Lemma rigid, with a ring of hairs at the base, rounded on the back, 5–7-nerved. Palet usually equalling the lemma, 2-nerved. Styles very short; stigmas plumose. Grain hairy at the apex.

1. *S. festucacea* (Willd.) Link. Stem 1–2 m high, smooth; leaf-blades 1.5–4 dm. long, 4–8 mm. wide, flat, scabrous on the margins; panicle open, 2–3 dm. long; spikelets 6–8 mm. long; empty glumes acute, unequal, 3–5-nerved, 6–8 mm. long, lemma narrow, 5–6 mm. long. In water: Iowa—Neb.—Sask.—Ore.—B.C. *Plain.* Jl—Au

66. PANICULÀRIA Fabr. MANNA-GRASS

Usually perennials with rootstocks (all ours), rarely annuals. Inflorescence paniculate. Spikelets usually numerous, ovate to linear, few-many-flowered, the glabrous rachilla articulate between the flowers. Empty glumes 2, obtuse or acute, unequal. Lemma obtuse or truncate, often denticulate, convex on the back, but not keeled, prominently nerved, hyaline at the apex. Palet 2-keeled. Styles short, distinct; stigmas plumose. [*Glyceria* R. Br.]

Spikelets ovate or oblong, 6 mm. long or less

Lemma 7-nerved, obscurely denticulate at the apex.

Spikelets 2–4 mm long, lemma broadly oval, 1.5–2 mm long.

Leaf-blades flat and lax; lemma slightly scarious-margined; branches of the inflorescence long; empty glumes obtuse.

Plant slender; branches of the inflorescence strongly ascending, nodding.

1. *P. nervata*.

Plant stout; branches of the inflorescence spreading or reflexed, not nodding.

2 *P. elata*
Leaf-blades conduplicate, stiff, ascending, lemma distinctly scarious-margined, branches of the inflorescence short, strongly ascending, not drooping

3 *P. rigida*
Spikelets 4-6 mm long, lemma narrowly oval, 2-3 mm long; inflorescence ample; branches finally spreading

4 *P. grandis*
Lemma barely scarious-margined; empty glumes acute, lanceolate

5 *P. pulchella*
Lemma with broad scarious margins, empty glumes obtuse

6 *P. pauciflora*
Lemma 5-nerved, distinctly dentate at the apex, broadly scarious-margined

7 *P. Holmii*
Spikelets 4-6-flowered

Spikelets linear, 10 mm. long or more, lemma 7-nerved, erose
Spikelets 10-17 mm long, on pedicels at least one-third their length.

8 *P. borealis*
Spikelets 15-20 mm long, subsessile or nearly so

9 *P. septentrionalis*
1. *P. nervata* (Willd.) Kuntze. Stem slender, 3-10 dm. high, leaf-blades 1.5-3 dm long, 4-10 mm. wide, smooth beneath, scabrous above; panicle 7-20 cm. long, open; spikelets 3-7-flowered, 2-3 mm. long; lemma 1.5 mm. long, obtuse or rounded at the apex, striate. Wet meadows and swamps: Lab—Fla.—Calif.—Alaska, Mex. *Submont.*—*Mont.* Je—Au.

2. *P. elata* Nash. Stem 5-15 dm. high, smooth; leaf-blades flat, scabrous on both sides, 2-4 dm. long, 6-10 mm. wide; panicle ample, 2-3 dm. long; spikelets 3-4 mm. long, ovate, 4-7-flowered; empty glumes hyaline, 1-1.5 mm. long; lemma 2 mm. long, its nerves vanishing near the apex. Shaded bogs: Mont.—Wyo—Calif.—B.C. *Submont.*—*Mont.* Jl—S

3. *P. rigida* (Nash) Rydb. Stem 3-4 dm. high; leaf-blades 5-15 cm. long, 3-4 mm wide; inflorescence small, about 1 dm. long; spikelets about 3 mm. long, 5-6-flowered; empty glumes about 1 mm. long, purplish; lemma rounded-oval, usually purplish, about 1.5 mm. long. Bogs and springs: Mont.—Ida.—Wyo. My—Jl.

4. *P. grandis* (S. Wats) Nash. Stem stout, 1-2 m. high, smooth; leaf-blades 1.5-4 dm. long, 6-15 mm. wide, smooth beneath, scabrous above; panicle 2-4 dm long, open, spikelets 4-7-flowered; lemma 2-2.5 mm. long. *P. americana* (Torr.) McMill. In water and wet places: N.B.—N.Y.—N.M.—Calif.—Alaska. *Plain*—*Submont.* Je—Au.

5. *P. pulchella* Nash. Stem 4-6 dm high, stout, smooth; leaf-blades 1.5-3 dm long, 2.5-6 mm wide, flat; panicle open, 1.5-3 dm. long; spikelets 4-6-flowered; empty glumes brownish or purplish, scarious-margined, obtuse; lemma usually purple, scabrous, about 3 mm. long. Swamps. Yukon—Mack.—N.M. *Submont.*—*Subalp.* Jl—S.

6. *P. pauciflora* (Presl) Kuntze. Stem 3-10 dm. high; leaf-blades 1-3 dm. long, 6-10 mm. wide, scabrous on both sides; panicle 1.5-2 dm. long, loose; branches ascending or spreading; spikelets 4-5 mm. long; empty glumes 1 mm. long, rounded at the apex; lemma about 3 mm long, scabrous. Wet meadows and in water. Mont.—Colo.—Calif.—B.C. *Submont.*—*Subalp.* Jl—Au.

7. *P. Holmii* Beal. Stem 2.5-5 dm high, pale; leaf-blades flat, 4-12 cm. long, 4-7 mm. wide, scabrous; panicle open, lax, 5-8 cm. long; empty glumes hyaline, 1-1.3 mm long; lemma scabrous, 2-2.2 mm. long. Shaded streams: Colo. *Mont.* Jl

8. *P. borealis* Nash. Stem glabrous, 6-15 dm. high; leaf-blades 1-2 dm, long, 2-10 mm. wide, erect, scabrous on both sides; panicle narrow, 2-5 dm. long; branches erect, smooth; spikelets 7-13-flowered; empty glumes scarious-margined, 1-nerved, the first acute, the second obtuse, erose; lemma 3.5-4 mm. long. Water and wet places: Me.—N.Y.—N.M.—Calif.—Alaska. *Submont.*—*Mont.* Jl—Au.

9. *P. septentrionalis* Hitchc. Stem 1-1.5 m. high; blades 1-2.5 dm. long, 6-8 mm wide; panicle 2-2.5 dm. long, subflexuose; spikelets 8-12-flowered; empty glumes obtuse; lemma 4-4.5 mm. long, hispidulous. *Glyceria fluitans* Am. auth., not R. Br. Shallow water: Newf.—Va.—Calif.—B.C. *Plain*—*Submont.*

67. **PUCCINELLIA** Parl. MEADOW-GRASS.

Perennials with rootstocks, ours tufted. Inflorescence paniculate. Spikelets 3-several-flowered; flowers perfect. Empty glumes 2, obtuse or acute, unequal. Lemma rounded on the back, obscurely 5-nerved. Palet nearly equalling the lemma. Styles wanting; stigmas sessile, plumose. Grain usually adherent to the palet.

Leaves mostly basal, panicle less than 1 dm long 1 *P. Lemmonii*
 Leaves scattered on the stem; panicle usually more than 1 dm long 2 *P. Nuttalliana*.
 Lemma 2-2.5 mm long, distinctly nerved 3 *P. tenuiflora*.
 Lemma 2 mm. long or less, obscurely nerved

1. *P. Lemmonii* (Vasey) Scribn. Stem 1-4 dm. high; leaves smooth, filiform, involute, short, the cauline ones few and reduced, panicle 5-10 cm. long, becoming open; branches short, spreading; empty glumes both 1-nerved, 2-3 mm. long; lemma 3 mm. long, smooth. *Glyceria Lemmonii* Vasey. Alkaline flats: Calif.—B.C.—Sask. Plain—Submont. Je-Jl.

2. *P. Nuttalliana* (Schultes) Hitchc. Stem 3-12 dm high, erect, strict; leaf-blades 5-10 cm. long, 3 mm. wide or less, usually involute or the upper flat; panicle open with spreading or ascending branches; spikelets scattered, 1-7-flowered, 3-6 mm. long; empty glumes unequal, the first acute, 1-nerved, the second obtuse or acute, 3-nerved. *P. atroides* (Nutt.) Wats. & Coult. *G. distans atroides* Nutt. Saline soil: Man.—Kans.—N.M.—Nev.—B.C.—Mack Plain—Subalp. Je—Au

3. *P. tenuiflora* (Griseb.) Scrib. & Merr. Stems 4-6 dm. high; leaf-blades 6-9 cm. long, 1-2 mm. wide, involute; panicle 1-1.5 dm long; branches capillary, ascending or spreading, scabrous, often 1 dm. long; spikelets 3-4 mm. long, 3- or 4-flowered. *Atrops tenuiflora* Griseb. Alkaline flats: Alaska—Sask Boreal—Plain—Submont. Je—Au.

68. **FESTUCA** L FESCUE-GRASS

Perennials, or annuals, usually tufted. Inflorescence paniculate. Spikelets 2-several-flowered, the flowers perfect or the upper ones staminate, the rachilla articulate between the flowers. Empty glumes 2, membranous, unequal, keeled, acute, the first mostly 1-nerved, the second 3-nerved. Lemma rounded on the back, at least below, acute, more or less awned, 3-7-nerved. Palet a little shorter than the lemma, 2-keeled. Stamens 1-3. Styles very short, distinct, terminal or nearly so; stigmas plumose, bilateral.

Perennials, stamens 3

Leaf-blades of the innovations narrow, 3 mm wide or less, involute
 Innovations extravaginal, i. e., plants with creeping rootstocks and stolons, leaves smooth

Spikelets pubescent. 1 *F. Kitahbeliana*

Spikelets glabrous or scabrous

Body of the lemma 5-7 mm long, leaf-blades rather firm

Stem-leaves with flat blades, innovations numerous 2 *F. rubra*

Stem-leaves with filiform involute blades, innovations few

Body of the lemma about 4 mm long, leaf-blades filiform, soft 3 *F. callicola*

Body of the lemma about 4 mm long, leaf-blades filiform, soft 4 *F. Earlei*

Innovations intravaginal, plants bunch-grasses
 Ligules short, truncate or rounded

Body of the lemma 3-8 mm long, leaf-blades long, persistent on the sheaths,

palet obtuse or 2-toothed at the apex

Pulvini at the bases of the branches of the panicle none or obsolete,

tufts easily separable.

Lemma (without the awns) 3-4 mm long, not half longer than the first glume, plant 1-2 (rarely 3) dm high, inflorescence spike-like.

Lemma lanceolate, long-acuminate and long-awned, panicle dense, leaf-blades short, scarcely filiform

Leaf-blades firm and sulcate, at least in age 5 *F. brachyphylla*.

Leaf-blades firm and terete, even in age. 6 *F. supina*

Lemma oblong-lanceolate, abruptly contracted into a short awn.

panicle lax, leaf-blades narrowly filiform and soft. 7 *F. minutiflora*.

- Lemna (without the awns) 5-8 mm long, plant usually over 3 dm. high
 Old sheaths of the innovations brown and papery 8 *F. calligera*.
 Old sheaths of the innovations neither brown nor papery.
 Basal leaf-sheaths short, remaining involute in age, blades of stem-leaves rarely 8 cm. long.
 Awn short, less than half as long as the lemma; inflorescence dense and narrow. 9 *F. sarimontana*.
 Awn long, from nearly equalling to much exceeding the lemma. Inflorescence open
 Awn little if at all exceeding the lemma in length, ovary glabrous
 Leaves scabrous. 10 *F. ingrata*. ✓
 Leaves smooth 11 *F. idahoensis*
 Awn much exceeding the lemma; ovary hispidulous at the apex 12 *F. occidentalis*
 Basal sheaths long and becoming flattened in age, often 1 dm long, blades of the stem-leaves over 1 dm long 13 *F. arizonica*
 Pulvini at the bases of the branches of the panicle rather conspicuous; tufts separable with difficulty. 14 *F. viridula*
 Body of the lemma 8-12 mm long; leaf-blades soon breaking off from the sheath, palst notched at the apex, bunch-grasses
 Branches of the panicle spreading or reflexed, spikelets shining, leaves smooth beneath 15 *F. altaica*.
 Branches of the panicle erect or ascending, spikelets rather dull, leaves very scabrous
 Plant 5-15 dm high; basal sheaths long, loose, in age more or less flattened, empty glumes narrowly lanceolate, acuminate, second glume shorter than the spikelet. 16 *F. campestris*.
 Plant 3-5 dm. high, basal sheaths usually short and close even in age, empty glumes acute, lanceolate, second glume about equaling the spikelet. 17 *F. scabrella*
 Ligules elongate, 4-9 mm long, acute 18 *F. Thurbert*.
 Leaf-blades all flat, 4 mm wide or more, perennials with rootstocks 19 *F. elatior*
 Lemma abruptly acute, not at all keeled
 Lemma awned or awn-pointed, keeled at least above the middle
 Awn or awn-point shorter than the lemma
 Lemma distinctly 5-nerved, awn from the cleft apex panicle ciliate
 Lemma with indistinct intermediate nerves, awn terminal; panicle not ciliate 20 *F. dasyclada*
 Awn longer than the lemma 21 *F. sororia*
 Annuals, stamens usually solitary 22 *F. subulata*.
 Spikelets 5-13-flowered, both glumes subulate. 23 *F. octoflora*.
 Spikelets loosely 1-5-flowered, first glume subulate, the second lanceolate
 Branches of the short panicle normally divergent, a pulvinus at the base of at least one of them
 Spikelets usually 3-5-flowered, only the main branches of the inflorescence divergent 24 *F. pacifica*
 Spikelets usually 1-3-flowered, all branches divergent or reflexed 25 *F. reflexa*
 Branches of the elongated narrow panicle erect and appressed. 26 *F. megalura*
1. **F. Kitaibeliana** Schultes. Stem 2-5 dm. high; blades of stem-leaves flat, 3-12 cm. long; inflorescence narrow, often secund; spikelets 8-12 mm. long, 5-9-flowered; empty glumes unequal, 2-4 mm. long, lanceolate, glabrous; lemma narrowly lanceolate, 5-6 mm. long; awn scabrous, 2-4 mm long. Hills and mountain sides: Greenl.—N.B.—Wyo.—Ore.—Alaska; Eurasia. *Submont* Je-Au.
2. **F. rubra** L. Stem 3-10 dm. high; blades soft, green or (in var. *glaucoides* Piper) more or less glaucous; panicle 5-20 cm. long, often narrow; spikelets 4-6-flowered, 7-8 mm. long, green or more or less glaucous, often purple-tinged; lemma 5-7 mm. long, lanceolate; awn scabrous, 1-4 mm. long. Hills: Greenl.—Va.—Colo.—Alaska; Eurasia. *Submont*.—*Subalp.* Je-Au.
3. **F. vallicola** Rydb. Stem 4-10 dm. high, slender, light-colored, smooth and shining; leaf-blades all filiform, 5-10 cm. long; panicle narrow, about 5 cm. long; spikelets 4-7-flowered, 8-10 mm. long; lemma about 5 mm. long, lanceolate, indistinctly 5-7-nerved, smooth or minutely scabrous; awn 2-4 mm. long. Meadows: Mont.—Wyo. *Submont.* Jl-Au
4. **F. Earlei** Rydb. Stem about 3 dm high, very slender; basal leaf-blades 5-10 cm. long, strongly involute, 0.5 mm. wide or less; stem-leaves 3-5 cm. long,

1 mm. wide or less; panicle narrow and spike-like, 3-5 cm. long; spikelets 2-3-flowered, about 5 mm long; lemma narrowly lanceolate, smooth, usually awned; awn 1 mm. or less long. Mountains: Colo. *Mont.* Jl.

5. *F. brachyphylla* Schultes. Stem 1-2 dm. (rarely 3 dm.) high; leaf-blades narrow, involute, 1-5 cm. long; panicle 2-5 cm. long; spikelets 2-5-flowered; lemma green or purplish, about 3 mm. long, acuminate; awn scabrous, 2-3 mm. long. *F. brevifolia* R. Br. Alpine-arctic regions. Greenl.—Vt.—N.M.—Ariz.—Calif.—Alaska. *Subalp.*—*Alp.* Jl-S.

6. *F. supina* Schur. Stems 1-2 dm. high; leaf-blades stiff, involute, often arcuate-spreading; panicle 1-5 cm. long, nearly simple; lemma lanceolate, 3-3.5 mm. long, acuminate, often tinged with red or brown, awn 1-3 mm. long. Alpine-arctic situations: Greenl.—Lab.—Colo.—B.C.; Eu. *Alp.* Jl-S.

7. *F. minutiflora* Rydb. Stem very slender, 1-1.5 (seldom 3) dm. high; leaves mostly basal; blades 1-10 cm. long, narrow and flaccid, about 0.5 mm. wide; panicle very narrow, lax, 2-4 cm. long, with very short, erect branches; spikelets, excluding the awns, about 5 mm. long, 2-3-flowered; lemma about 2 mm. long, purple-tinged above; awn 1.5 mm. long or less. Mountains: Colo. *Mont.*—*Subalp.* Je-Au.

8. *F. calligera* (Piper) Rydb. Stem pale, 1.5-5 dm. high; leaf-blades filiform, glaucous, strongly striate, 5-15 cm. long, about 0.5 mm. wide; sheaths of the stem-leaves looser, panicle narrow, 1-1.5 dm. long; branches ascending; spikelets 4-7-flowered; lemma about 5 mm. long, abruptly acuminate; awn 1-2 mm. long. *F. ovina calligera* Piper. Mountains: Ariz.—Nev.—Utah—Colo. *Son.*—*Submont.* Jl-Au.

9. *F. saximontana* Rydb. Densely tufted perennial; stem 2-4 dm. high, slender, glabrous; leaf-blades very slender, 3-10 cm. long, less than half a millimeter wide, strongly involute; panicle 4-10 cm. long; spikelets 4-6-flowered; lemma lanceolate, 3-5 mm. long, glabrous; awn 1-2 mm. long. *Festuca pseudovina* (Beal) Rydb., not Hack. Dry ridges: Mich.—Sask.—Colo.—B.C. *Mont.*—*Alp.* Je-Au.

10. *F. ingrata* (Hack.) Rydb. Stem 1-3 dm. high; leaf-blades filiform, involute, those of the sterile shoots 1.5-3 dm. long, 0.5 mm. wide or less; panicle 8-15 cm. long; spikelets 3-8-flowered, 8-15 mm. long; lemma 6-8 mm. long, more or less scabrous, awn 3-4 mm. long. *F. ovina ingrata* Hack. Meadows and hillsides: Mont.—Colo.—Utah—B.C. *Submont.*—*Subalp.*

11. *F. idahoensis* Elmer. Stem 7-9 dm. high; leaf-blades filiform, involute, those of the sterile shoots 2-4 dm. long, less than 0.5 mm. wide; inflorescence 7-12 cm. long, open; spikelets 3-5-flowered, about 1 cm. long or less; lemma obscurely 5-nerved, 6 mm. long; awn about 3 mm. long. Meadows: Ida. *Submont.* Jl.

12. *F. occidentalis* Hook. Stem slender, 5-8 dm. high; leaf-blades 5-20 cm. long, glabrous; panicle loose, subsecund, flexuous, 8-20 cm. long; spikelets 3-5-flowered, 6-10 mm. long, pale green or purplish; lemma 5-6.5 mm. long, scabrous towards the apex; awn of about the same length. Meadows and hillsides: B.C.—Calif.—Wyo.—Mont. *Submont.* Ap-Jl.

13. *F. arizonica* Vasey. Stem 4-7 dm. high; leaf-blades 1.5-2.5 dm. long, scabrous; panicle rather narrow, 7-12 cm. long; branches erect, somewhat secund, scabrous; spikelets 4-6-flowered, 10-13 mm. long; lemma 6-7 mm. long, thick, acuminate; awn 1-2 mm. long. *F. Vaseyana* Hack. Hills and open woods: Colo.—N.M.—Ariz.—Utah. *Mont.* Jl-S.

14. *F. viridula* Vasey. Stem 3-6 dm. high; leaf-blades erect, the basal ones 1-3 dm. long, involute; those of the stem often flat, shorter; panicle loose, open, 1-1.5 dm. long; spikelets 3-6-flowered, 10-12 mm. long; lemma smooth and shining, 6-7 mm. long, pointed. Mountain meadows: B.C.—Ida.—Calif. *Mont.*—*Subalp.* Je-Au.

15. *F. altaica* Trin. Stem erect, smooth, 3-9 dm. high; leaf-blades involute, 1.5-3 dm. long; panicle loose and open, 1-2 dm. long; spikelets 3-5-flowered,

12-15 mm. long, green or more commonly copper-colored or purple; empty glumes smooth or nearly so; lemma ovate, attenuate, finely and densely scabrous, somewhat shiny, 10-12 mm long. Subarctic regions: Alaska—Yukon—Canadian Rockies—(Mt. Albert) Que.—Lab; Siberia. *Subalp.* Je—Au.

16. *F. campestris* Rydb. Stem 4-10 dm. high; leaf-blades 3-5 dm. long, scabrous, panicle 12-25 cm. long; spikelets 10-12 mm. long, 2-4-flowered; empty glumes membranous, narrowly lanceolate, acuminate; lemma very scabrous, attenuate, thicker than the empty glumes, 9-10 mm. long. *F. scabrella major* Vasey Plains and hills: Alta.—N.D.—Wash.—Yukon. *Plain—Submont.* Je—Au.

17. *F. scabrella* Torr. Stem 3-5 dm. high; blades of the basal leaves 1-2 dm. long, scabrous, striate; those of the upper stem-leaves short, 3-5 cm long, often flat, panicle small, 5-15 cm. long; branches ascending; spikelets often purple-tinged, 3-4-flowered, about 1 cm. long; lemma scabrous, 6-8 mm. long, acute. *F. Hallii* (Vasey) Piper. Mountains: Alta.—Mont.—Wash.—B.C.; Colo. *Mont.* Je—Jl.

18. *F. Thurberi* Vasey. Stem 6-10 dm. high; leaf-blades involute, 6-20 cm long, very scabrous; panicle 1-1.5 dm. long, loose, slightly drooping; spikelets 3-6-flowered, 8-12 mm long; empty glumes smooth or scabrous on the keel; lemma finely scabrous near the margins or glabrous, cuspidate-acuminate, 7-8 mm. long. *Poa festuoides* and *P. Kenbensis* M. E. Jones. Hillsides and mountains: N.M.—Wyo.—Utah *Mont—Subalp.* Jl—S.

19. *F. elatior* L. Stem smooth, 5-12 dm. high; leaf-blades 1-6 dm. long, 4-8 mm wide, smooth beneath, scabrous above; panicle 1-2 dm. long, rather open in anthesis, narrowed in fruit; spikelets 3-13-flowered, usually 6-8-flowered, 9-11 mm. long; lemma 5-7 mm long, scabrid towards the apex. Meadows and copses: N.S.—N.C.—N.M.—Calif.—B.C.; cult and nat. from Eu. *Plain—Submont.* Je—Au.

20. *F. dasyclada* Hack. Stem erect, 2-4 dm high; leaf-blades soft, often folded, glabrous, 5-15 cm. long; panicle open; spikelets 2-flowered, 6-7 mm. long, lemma about 6 mm. long, scabrous-puberulent, 2-toothed at the apex; awn 3 mm. long. Mountains: "Utah."

21. *F. sororia* Piper. Stem 6-9 dm. high, smooth and shining; leaf-blades thin, flat, spreading, 1-2.5 dm. long, 3-6 mm. wide, scabrous on the margins, panicle 1-1.5 dm. long, somewhat nodding, lax; spikelets 3-5-flowered, 7-12 mm. long; empty glumes membranous; lemma 6-9 mm. long, keeled at the base, scabrous; awn 0.5-2 mm long. *F. fratercula* Piper, not Rupr. Open hillsides, cañons, and meadows. Colo.—Utah—Ariz.; Mex. *Submont.—Subalp.*

20. *F. subulata* Trin. Stem 4-12 dm high; leaf-blades dark green above, flat, thin, 1-3 dm. long, 3-10 mm. wide, scabrous on both sides; panicle very loose, drooping, 1.5-4 dm. long, branches reflexed; spikelets 3-5-flowered, 7-12 mm long, lemma somewhat keeled, scabrous toward the apex, 5-7 mm long, attenuate into a scabrous awn 5-20 mm. long. *F. Jonesii* Vasey. Woods: Alaska—Calif.—Utah—Colo.—Mont. *Mont.—Subalp.* Je—Au.

23. *F. octoflora* Walt. Usually tufted, stems 5-40 cm high, glabrous or retrorsely puberulent; leaf-blades involute or rarely flat, 2-10 cm. long, panicle narrow, erect, racemiform, 3-12 cm. long; spikelets 5-10 mm. long, rarely longer; lemma lanceolate, scabrous to glabrous, 4-5 mm. long, attenuate; awn straight, 1-7 mm. long. *F. tenella* Willd. In dry sandy soil: Que.—Fla.—Calif.—B.C. *Plain—Mont.* Ap—Jl.

24. *F. pacifica* Piper. Simple or somewhat tufted; stem 1-5 dm. high, glabrous; leaf-blades glabrous, loosely involute, 3-5 cm. long; panicle more or less secund, 5-12 cm. long; branches solitary, bearing spikelets on the lower side, spikelets 3-6-flowered; lemma lanceolate, scabrous, except that of the lowest flower, which is smooth, 6-7 mm. long; awn scabrous, 10-15 mm. long. River valleys and hills: B.C.—Utah—N.M.—Ariz.—L. Calif. *Son.—Submont.* Ap—Jl.

25. *F. reflexa* Buckley. Simple or rarely tufted; stem erect, 2-5 dm. high; leaf-blades flat or loosely involute, 2-10 cm. long; panicle 5-12 cm. long; spikelets 1-3- (rarely 4- or 5-) flowered, 5-7 mm. long; lemma lanceolate, smooth or scabrous, 4.5-6 mm. long, attenuate; awn scabrous, 2-12, usually 5-8 mm. long. Dry places: B.C.—Utah—Calif. *Son.*—*Submont.* My-Je.

26. *F. megalura* Nutt. Simple or somewhat tufted; stems 2-6 dm. high, glabrous; leaf-blades involute or flat; panicle 1-3 cm. long; spikelets 4-5-flowered, 8-11 mm. long; lemma obscurely 5-nerved, 4-6 mm. long, scabrous and ciliate on its upper half; awn scabrous, 8-15 mm. long. Dry soil: B.C.—Ida—Ariz.—Calif; Mex., Equador, Peru, and Chili. *Submont.* Ap-Je.

69. *HESPERÓCHLOA* (Piper) Rydb.

Dioecious perennials, densely tufted, producing both intravaginal innovations and stout extravaginal stolons. Panicle narrow. Spikelets 3-5-flowered, those of the staminate plant flattened, those of the pistillate one turgid. Empty glumes 2, lanceolate, subscarious, the lower 1-nerved, the upper 3-nerved. Lemma ovate, 5-nerved, acuminate. Palet shorter than the lemma. Ovary hispidulous at the apex, deeply sulcate; stigma elongate, the numerous short branches arising on all sides. Grain 2-dentate at the apex.

1. *H. Kingii* (S. Wats.) Rydb. Stems stout, striate, glabrous, 4-10 dm. high; leaf-blades firm, flat or loosely involute, coarsely striate, 1-3 cm. long, 3-6 mm. wide; panicle narrow, erect, 8-20 cm. long; spikelets 6-10 mm. long, empty glumes nearly smooth, shining, the first 3-4.5 mm. long, the second 5-7 mm. long; lemma ovate, abruptly acuminate, scabrous, 5-8 mm. long. *Poa Kingii* S. Wats. *Festuca confinis* Vasey. Cañons and hillsides: Orc.—Calif—Colo—Neb.—Mont. *Submont*—*Subalp.* Je-Au.

70. *BRÔMUS* L. BROME-GRASS, CHESS, CHEAT

Annuals or perennials, with paniculate inflorescence. Spikelets usually large, often drooping, several-many-flowered; flowers perfect or the upper ones imperfect. Empty glumes 2, membranous, persistent, narrow, unequal, acute or the second one sometimes short-awned. Lemma longer than the glumes, rounded or keeled on the back, usually awned, the awn dorsal and inserted just below the 2-toothed apex. Palet shorter than the lemma, 2-keeled. Ovary crowned with a villous appendage, at the base of which arise the lateral styles; stigmas plumose.

Second empty glume 5-7-nerved; first empty glume 3-nerved

Lemma compressed-keeled

Palet less than three-fourths as long as the lemma, which is scarcely toothed

Sheaths and usually also the blades hairy, lemma pubescent or hispidulous-scabrous

Lemma hispidulous-scabrous

Awns 10-15 mm. long

Awn 4-6 mm. long

Lemma pubescent; awns 4-8 mm. long

Lower branches of the panicle 7 cm. long or less, in fruit erect

Leaves flat, not canescent

Leaves involute, canescent.

Lower branches of the panicle 1 dm. long or longer, spreading in fruit.

1. *B. Hookerianus*

2. *B. Flodmanni*

3. *B. brevistylatus*

4. *B. subrelutinus*

5. *B. laetior*

Sheaths and blades glabrous or minutely scabrous

Panicle narrow, strict, awn 4-6 mm. long

Panicle open, spreading and nodding; awn 6-7 mm. long

6. *B. polyanthus*.

5. *B. paniculatus*

Palet more than three-fourths as long as the lemma, which is distinctly toothed at the apex

8. *B. unioloides*

Lemma rounded on the back, broadly elliptic. Introduced tufted annuals or biennials.

Lemma nearly as broad as long, awnless or with a very short awn

9. *B. brizaeformis*

Lemma much longer than broad, conspicuously awned

Lemma and glumes glabrous

Awn much shorter than the lemma, nearly erect

Sheaths glabrous

Sheaths densely pubescent

Awn fully as long as the lemma, at maturity strongly divergent, sheaths pubescent

10. *B. secalinus*.

11. *B. racemosus*

12. *B. patulus*.

- Lemma and glumes more or less pubescent 13 *B. hordeaceus*.
 Second empty glume 3-nerved; first empty glume 1-nerved, except in *B. Porteri*.
 Awns shorter than the lemma; plants perennial with rootstocks, all native except *B. inermis*.
 Inflorescence more or less drooping.
 Awn 6-9 mm long, empty glumes sparingly pubescent or glabrous 14 *B. eximius*.
 Awn 2-5 mm long
 Empty glumes decidedly pubescent
 First empty glume 3-nerved, inflorescence narrow.
 First empty glume 1-nerved, inflorescence open 15 *B. Porteri*.
 Sheaths with a ring of dense hairs at the base of the blades.
 Sheaths without a ring of hairs 16 *B. latiglumis*.
 Empty glumes glabrous or merely scabrous on the nerves. 17 *B. purgans*.
 Lemma evenly pubescent on the back; sheaths densely hairy
 Lemma ciliate on the margins, glabrous or sparingly hairy on the back;
 sheaths glabrous or the lower sparingly hirsute 18 *B. lanatipes*.
 Inflorescence not drooping. 19 *B. ciliatus*.
 Inflorescence narrow, its branches erect, lemma usually with awn 2-3 mm.
 long 20 *B. Pumpellianus*.
 Inflorescence broad, its branches spreading, lemma usually awnless.
 21 *B. inermis*.
 Awn longer than the lemma; introduced tufted annuals.
 Spikelets numerous on slender, recurved pedicels; lemma 8-12 mm long.
 22 *B. tectorum*.
 Spikelets few, pedicels not recurved, lemma 12-30 mm long
 Awn less than 3 cm long. 23 *B. sterilis*.
 Awn 3.5-4 cm long 24 *B. maximus*.

1. *B. Hookerianus* Thurb. Annual or biennial; stem erect, 4-8 dm. high; leaf-blades flat, 1-2.5 dm. long, 5-12 mm. wide; panicle 2-4 dm. long; branches spreading; spikelets 5-10-flowered, 3-4 cm. long, 5-7 mm. wide; empty glumes glabrous, 15-18 mm. long, gradually acuminate; lemma about 2 cm. long, broadly hyaline-margined. Plains: B.C.—Ida.—Calif. *Submont.* My-Jl.

2. *B. Flodmanii* Rydb. Short-lived perennial; stem glabrous, 6-10 dm. high, leaf-blades 2-3 dm. long, 6-10 mm. wide, minutely scabrous; panicle 1-2 dm. long; spikelets 2.5-3.5 cm. long, 5-7 mm. wide; empty glumes lanceolate, about 1 cm. long, glabrous, acute; lemma about 15 mm. long, scabrous, narrow-margined, acuminate. Meadows: Mont. *Submont.*

3. *B. breviaristatus* (Hook.) Buckl. Tufted short-lived perennial; stem 6-12 dm. high; leaf-blades sparsely pilose throughout or glabrate, 1.5-2.5 dm. long, 6-12 mm. wide; panicle erect, narrow, 1-2 dm. long; spikelets 2.5-4 cm. long, 5-7 mm. wide, 7-9-flowered; empty glumes scabrous or scabrous-puberulent, lemma 11-14 mm. long; awn 4-5 mm. long. *B. marginatus* Nees. Meadows: B.C.—Calif.—Colo.—Neb.—Alta. *Submont.*

4. *B. subvelutinus* Shear. Erect tufted perennial; stem pubescent above, 2.5-5 dm. high; leaf-blades linear, rigid, involute, canescent, with spreading hairs; panicle 5-10 cm. long, narrow, erect; spikelets short-pedicel or subsessile, 5-7-flowered, 2-3 cm. long; empty glumes puberulent, 8-12 mm. long; lemma appressed-pubescent; awn 3-4 mm. long. Arid regions: Nev.—Calif.—Wash.—Ida. *Son.*

5. *B. latior* (Shear) Rydb. Stout perennial; stem 7-18 dm. high; leaf-blades 2-3 dm. long, 7-10 mm. wide, more or less pilose; panicle 2-3 dm. long; spikelets 2.5-4 cm. long, 6-8 mm. wide; empty glumes pubescent, about 1 cm. long, acuminate; lemma densely pubescent, about 15 mm. long, acuminate, slightly bifid, awn 6-7 mm. long. *B. marginatus latior* Shear. Meadows: Wash.—Calif.—N.M.—Mont. *Submont.*—Mont. Je-Au.

6. *B. polyanthus* Scribn. Stout short-lived perennial; stem glabrous, or puberulent at the nodes; leaf-blades 1-2 dm. long, 4-8 mm. wide, scabrous, especially above; panicle 1-2 dm. long; spikelets 3-3.5 cm. long, densely 7-11-flowered; empty glumes smooth or nearly so, subacute or obtuse; lemma smooth or minutely scabrous. Meadows: Mont.—N.M.—Utah—Ore. *Submont.*—Subalp. Je-Au.

7. *B. paniculatus* (Shear) Rydb. Tall leafy perennial; stem 6-10 dm. high; leaf-blades 2-3 dm. long, 8-12 mm. wide, scabrous; panicle 2-3 dm. long; spikelets loosely 5-7-flowered, 2-3 cm. long, 6-7 mm. wide; empty glumes obtuse, glabrous; lemma glabrous, 11-14 mm. long, scarious-margined, acute. *B. polyanthus paniculatus* Shear. Mountain meadows: Colo.—N.M.—Ariz.—Utah. *Submont.* Jl—Au.

8. *B. unioides* (Willd.) H.B.K. Stout, more or less tufted annual; stems 3-10 dm. high, glabrous; sheath pilose-pubescent, rarely glabrous, panicle 1.5-3.5 dm. long; branches ascending or spreading; spikelets 2-3.5 cm. long, 5-9 mm. broad, 7-11-flowered; empty glumes smooth or slightly scabrous; lemma broadly lanceolate, acute, nearly glabrous to strongly scabrous, 13-16 mm. long; awn usually present, 2 mm. long or less. Fields, prairies, and waste places: Fla.—Colo.—Calif. *Son.* Ap—Au.

9. *B. brizaeformis* Fisch & Mey. Stem 3-6 dm. high, glabrous or slightly pubescent at the nodes; leaf-blades pubescent on both sides, 5-10 cm. long, 2-5 mm. wide; panicle 5-25 cm. long, lax, secund, nodding; spikelets 15-25 mm. long, ovate; empty glumes obtuse, smooth or minutely scabrous; lemma about 1 cm. long, very broad, smooth or minutely scabrous, broadly scarious-margined. Waste places and fields: Mass.—Del.—Calif.—B.C.; adv from Eurasia *Plain*—*Submont.* Je—Jl.

10. *B. secalinus* L. Stem 3-7 dm. high, smooth or pubescent at the nodes; leaf-blades 1-2 dm. long, sparsely pubescent above, glabrous beneath; panicle 8-18 cm. long, at first erect, drooping in fruit; spikelets 10-18 mm. long, 6-8 mm. broad; lemma 6-8 mm. long, obtuse, smooth or scabrous, its margins strongly incurved in fruit; awn 3-5 mm. long. *CHEAT.* Fields and waste places: Me.—Fla.—Calif.—Wash; nat. from Eu. *Plain.* Ap—Au.

11. *B. racemosus* L. Stem 3-7 dm. high, scabrous-puberulent under the inflorescence and pubescent at the nodes; leaf-blades 7-14 cm. long, pilose-pubescent, panicle simple, somewhat nodding; spikelets 15-20 mm. long, 5-9-flowered, acute; lemma smooth or scabrous, 6-8 mm. long, very shortly bidentate at the apex; awn 5-8 mm. long, straight. Waste places: N.S.—Ga.—N.M.—Ore.—Wash—Yukon; adv. from Eu. *Plain*—*Submont.* Je—Au.

12. *B. patulus* Mert. & Koch. Stem somewhat geniculate at the base, 4-6 dm. high; leaf-blades pubescent, 4-10 cm. long, 2-4 mm. wide; panicle 12-20 cm. long, diffuse, somewhat drooping; spikelets 2-2.5 cm. long, 5-6 mm. wide; lemma 7-9 mm. long, hyaline-margined, emarginate, glabrous. Waste places: Mass.—Colo.—S.D., adv. from Eu. *Plains* Je—Jl.

13. *B. hordeaceus* L. Stem 2-8 dm. high, usually somewhat pubescent; leaf-blades 5-15 cm. long, 3-5 mm. broad, pilose or glabrate; panicle contracted, 5-10 cm. long; spikelets 5-13-flowered, 12-15 mm. long, 4-6 mm. wide; lemma obtuse, coarsely pilose, 8-9 mm. long; awn stout, 6-9 mm. long. *B. mollis* L. *HAIRY CHEAT.* Waste places, roadsides, fields: Me.—N.C.—Calif.—B.C.; nat. from Eu. *Plain*—*Submont.* My—Jl.

14. *B. eximius* (Shear) Piper. Stem slender, 8-11 dm. high, somewhat pubescent, at least at the nodes; sheaths pilose; leaf-blades 1.5-2.5 dm. long, 5-9 mm. wide, thinly pilose above; panicle 8-12 cm. long, nodding; spikelets few, 15-25 mm. long, 3-4 mm. wide; lemma 8-10 mm. long, sparsely pubescent on the back, ciliate near the margins. *B. vulgaris* Shear, in part. Wet places: B.C.—Mont.—Wyo.—Calif. *Submont.* Jl—Au.

15. *B. Porteri* (Coul.) Nash. Stem 5-9 dm. high, pubescent at the nodes; sheaths usually sparingly short-pilose; leaf-blades 7-30 cm. long, 3-5 mm. wide, scabrous; panicle 1-2 dm. long, drooping; spikelets 2-2.5 cm. long, 7-9-flowered; lemma 11-13 mm. long, coarsely pubescent, the apex hyaline, slightly emarginate; awn 2-4 mm. long. Hillsides and meadows: Man.—N.M.—Ariz.—Alta. *Plain*—*Subalp.* Je—Au.

16. *B. latiglumis* (Shear) Hitchc. Stem 6-10 dm. high, very leafy, slightly pubescent at the nodes or glabrous; leaf-blades 1-3 dm. long, 5-8 mm. wide, scabrous and sometimes sparingly hairy above, with conspicuous auricles at the

base; panicle 1-3 dm. long, open, somewhat nodding; spikelets 2-3 cm. long, loosely 6-10-flowered; lemma about 1 cm. long, broadly lanceolate, pilose, densely so toward the base; awn 4-5 mm. long. *B. purgans latiglumis* Shear. Meadows. Conn.—Pa.—Mo.—Neb.—Mont. *Plain*. Je—Au.

17. *B. purgans* L. Stem 7-14 dm. high, glabrous or pubescent at the nodes; leaf-blades 1.5-3 dm. long, 5-15 mm. wide, somewhat auricled at the base, short-pilose on the veins above, scabrous or smooth beneath; panicle lax, nodding, 1.5-2.5 dm. long; spikelets 7-14-flowered, 2-2.5 cm. long; lemma acute, 10-12 mm. long, sparsely pubescent across the back; awn 4-6 mm. long, straight. Woods and shady banks: Que.—Ga.—Okla.—Wyo. *Plain—Submont.* My—Jl.

18. *B. lanatipes* (Shear) Rydb. Stem 4-10 dm. high, smooth, or pubescent at the nodes; leaf-blades 2-3 dm. long, 5-7 mm. wide, scabrous on both sides; panicle open, 2-3 dm. long; branches ascending; spikelets 2-3 cm. long, 7-11-flowered; lemma about 1 cm. long, obtuse, emarginate; awn 4-5 mm. long. Hillsides. Colo.—N.M.—Calif. *Submont.—Mont.* Jl—Au.

19. *B. ciliatus* L. Stem 6-13 dm. high, glabrous; leaf-blades 1.5-2.5 dm. long, 5-12 mm. wide, mostly scabrous above, glabrous beneath; panicle large, drooping, 1.5-2.5 dm. long, spikelets 2-3 cm. long, 6-11-flowered; lemma obtuse, emarginate, 12-15 mm. long, awn 3-5 mm. long, straight. *B. Richardsoni* Link. Meadows and hillsides: Sask.—N.M.—Ariz.—Ore.—B.C. *Plain—Subalp.* Je—Au.

20. *B. Pumpellianus* Scribn. Stem glabrous, or pubescent merely at the nodes, leaf-blades 1-2 dm. long, 5-10 mm. wide, smooth beneath, scabrous or slightly pubescent above, auricled at the base; spikelets erect, 7-11-flowered, 2-3 cm. long, 5-7 mm. wide; lemma 10-12 mm. long, coarsely ciliate along the margins and across the back at the base. Meadows and hillsides: Sask.—S.D.—Colo.—B.C.—Alaska. *Submont.—Mont.*

21. *B. inermis* Leyss. Stem 5-10 dm. high; leaf-blades smooth and glabrous, 1.5-2.5 dm. long, 5-10 mm. wide; panicle 1-2 dm. long; spikelets 2-2.5 cm. long, 4-5 mm. wide; lemma 9-12 mm. long, obtuse, emarginate, typically glabrous. Fields and meadows: Man.—Ohio—N.M.—Wash.—Mont.; escaped from cultivation. Je—Au.

22. *B. tectorum* L. Stems 3-6 dm. high, glabrous; leaf-blades mostly pubescent throughout; panicle 6-15 cm. long; spikelets 13-20 mm. long; lemma lanceolate, scabrous-puberulent to pilose-pubescent, 11-13 mm. long, narrowly 2-toothed at the apex; awn straight, 13-15 mm. long. Waste places and sandy soil. Mass.—Va.—Miss.—Colo.—Calif.—B.C.; adv. or nat. from Eu. *Plain—Submont.* My—Jl.

23. *B. sterilis* L. Stem erect or ascending, 5-10 dm. high; leaf-blades pubescent throughout; panicle 1-2 dm. long, lax, open; spikelets 2.5-3.5 cm. long, 6-10-flowered; empty glumes lance-subulate, the first 7-9 mm. long, the second 11-13 mm. long; lemma linear-lanceolate, 12-16 mm. long, scabrous; awn stout, very rough. Waste places: Mass.—D.C.—Colo.—Wash.—B.C.; adv. from Eu. *Plain—Submont.* My—Jl.

24. *B. maximus* Desf. Stem 2-4 dm. high, smooth; leaf-blades flat, 3-5 mm. broad, pilose on both sides; panicle erect, somewhat secund, 5-10 cm. long; spikelets 5-7-flowered, 3.5-5 cm. long, exclusive of the awns; lemma 5-nerved, 2.5-3 mm. long, harshly scabrous, 2-toothed at the apex. Waste places and fields. Calif.—Wash.—Ida.—B.C.; adv. from the Old World.

71. *Lolium* L. DARNEL, RYE-GRASS.

Perennials with rootstocks, or annuals, with terminal 2-sided spikes. Spikelets with the edge towards the rachis, compressed, several-many-flowered; flowers perfect or the upper ones imperfect; rachilla articulate between the flowers. Empty glumes in the terminal spikelet 2, in the lateral spikelets 1, facing the rachis, the inner one lacking. Lemma shorter and broader than the empty glume, rounded on the back. Palea shorter than the lemma, 2-keeled. Styles distinct, short; stigmas plumose.

Empty glumes shorter than the spikelet, perennial.
Empty glume longer than the spikelet; annual.

1. *L. perenne*
2. *L. temulentum*

1. ***L. perenne* L.** Stem 2-8 dm. high, smooth; leaf-blades 5-12 cm. long, 2-4 mm. wide, smooth; spike 7-20 cm. long; spikelets 5-10-flowered, 8-12 mm. long; empty glume strongly nerved; lemma 4-6 mm. long, acuminate, awnless. Waste places and cultivated ground: N.S.—Va.—N.M.—Calif.—B.C. nat. from Eurasia. Je—Au.

2. ***L. temulentum* L.** Stem 6-12 dm. high, smooth; leaf-blades 1-2.5 dm. long, 2-6 mm. wide, smooth beneath, rough above; spike 1-3 dm. long; spikelets 4-8-flowered, 10-18 mm. long; empty glume strongly veined; lemma awned or awnless. Poisonous. Waste places and cultivated ground: N.B.—Ga.—Calif.—B.C.; nat. from Eu. Je—Au.

72. **AGROPYRON** Gaertner WHEAT-GRASS, QUITCH-GRASS, QUICK-GRASS.

Perennials with terminal, 2-sided spikes; spikelets compressed, with the side of the spikelet towards the rachis, usually single at each node; flowers perfect, or the upper ones imperfect; rachilla articulate between the flowers. Empty glumes 2, standing at right angles to the median plane of the spike, i. e., with one edge toward the rachis, usually firm. Lemma broader, rigid, rounded on the back, from obtuse to acuminate, awnless or awned. Palet shorter than the lemma, 2-keeled, ciliate on the keels. Styles very short; stigmas plumose. Fruit enclosed in the lemma, adherent to the palet

Rachis of the spike breaking up at maturity, the internodes falling with the spikelets.
lemma long-awned 1 *A. Scribneri*.

Rachis of the spike remaining continuous

Tufted plants with intravaginal innovations, no horizontal stolons (except in *A. arizonicum*).

Lemma long-awned, i. e., the awn usually longer than the body of the lemma

Basal leaf-blades shorter than the upper ones, spikelets slightly compressed, awns somewhat spreading 2. *A. Gmelini*

Basal leaf-blades longer than the upper ones

Awn divergent

Spikelets remote on the axis, more or less compressed

Spikelets erect, empty glumes nearly equalling the spikelet

3 *A. Vaseyi*

Spikelets spreading or ascending; empty glumes half as long as the spikelet

Empty glumes linear-oblong, acute or obtuse; stem-leaves 3 or 4, not glaucous 4 *A. spicatum*.

Empty glumes narrowly lanceolate, acuminate or awn-pointed, stem-leaves 6 or 7, glaucous 5. *A. arizonicum*

Spikelets crowded on the axis, subterete

6 *A. Bakeri*

Awns erect

Plant tall, usually more than 3 dm. high, erect or ascending, empty glumes broadest below the middle, spike elongated

Stem stout; spike 7-10 mm. thick, erect, but usually unilateral, spikelets (exclusive of the awns) 15-25 mm. long

7 *A. Richardsoni*.

Stem slender; spike about 5 mm. thick, seldom unilateral, spikelets (exclusive of the awns) about 1 cm. long 8. *A. caninoides*

Plant 2-3 dm. high, decumbent at the base, geniculate, empty glumes broadest above the middle, scarious-margined, spike short and dense 9 *A. andinum*

Lemma short-awned or awnless

Spike stout and dense, 3-8 cm. long; empty glumes broadest above the middle

Lemma densely pubescent, empty glumes conspicuously white-margined

10 *A. latiglume*

Lemma glabrous or scabrous, empty glumes not conspicuously white-margined 11 *A. biflorum*

Spike slender and lax, 7-20 cm. long; empty glumes broadest below the middle.

Spikelets terete, appressed, empty glumes nearly as long as the spikelets

12. *A. tenerum*.

Spikelets flattened, empty glumes much shorter than the spikelets

13 *A. inermis*

Stoloniferous plants with horizontal rootstocks, sometimes slightly tufted, innovations extravaginal.

Lemma with a long, more or less divergent awn

Lemma pubescent.

14 *A. albicans*

Lemma glabrous or scabrous

Spikelets subterete, appressed

15 *A. Griffithsi*.

- Spikelets compressed, spreading 5. *A. arizonicum*.
 Lemma awnless or with a very short erect awn; empty glumes usually narrowly lanceolate, acuminate
 Sheaths conspicuously pilose 16 *A. Palmeri*
 Sheaths glabrous or nearly so
 Lemma glabrous or merely scabrous.
 Spikelets erect, nearly cylindric or slightly compressed.
 Spike elongate; empty glumes nearly equalling the spikelets 17. *A. pseudorepens*.
 Spike short, empty glumes about half as long as the spikelets 18 *A. riparium*.
 Spikelets much flattened, spreading. 19. *A. Smithii*.
 Lemma from villous to hispidulous.
 Lemma short-pubescent.
 Spikelets compressed, more or less spreading; lemma acuminate or strongly acute 20 *A. molle*
 Spikelets terete or nearly so, erect; lemma obtuse or acutish.
 Spike loose, elongate; lemma sparingly pubescent. 21 *A. lanceolatum*.
 Spike dense and short; lemma densely pubescent 22. *A. subvillosum*
 Lemma long-villous 23. *A. dasystachyum*

1. **A. Scribneri** Vasey. Densely tufted perennial; stems decumbent and geniculate at the base, 2-5 dm. high; leaf-blades short, 3-10 cm. long, 2-4 mm. wide, rigid, attenuate-pointed; spike 5-7 cm. long, flexuous; spikelets 3-6-flowered; empty glumes linear-lanceolate or subulate, 3-5-nerved, smooth, long-awned, lemma oblong-lanceolate, 8-10 mm. long, smooth, 5-nerved; awn divergent, scabrous, 1.5-2.5 cm. long. This species connects the genus with *Silanton*. High mountains. Mont.—N.M.—Ariz. *Subalp*—*Alp* JI-Au.

2. **A. Grmelini** (Griseb.) Scribn. & Smith. Stems 6-12 dm. high, glabrous, slender; blades of stem-leaves 12-30 cm. long, flat or involute; those of the basal leaves 3-7 cm. long, 4-6 mm. wide; spike slender, 1-2.5 dm. long; spikelets 10-20, 6-9 mm. long, 7-9-flowered; empty glumes unequal, 10-14 mm. long, oblong-lanceolate, acuminate or short-awned; lemma oblong-lanceolate, acuminate, 10-12 mm. long; awn scabrous, 15-30 mm. long, at last divergent. Hillsides. Wash.—Alta.—Wyo.; Siberia *Submont.* JI-Au.

3. **A. Vaseyi** Scribn. & Smith. Stem erect, 3-5 dm. high, wiry, glabrous; leaf-blades 3-15 cm. long, 1-2 mm. wide, usually involute; spike slender, 5-10 cm. long, often somewhat flexuose; spikelets 3-5-flowered; empty glumes oblanceolate or oblong, acute or acuminate, 6-8 mm. long, lemma 8 mm. long, lanceolate, acute, awn 8-10 mm. long. Hills and mountain sides. Wash.—Ore.—Colo.—Mont. *Submont* My-Au.

4. **A. spicatum** (Pursh) Scribn. & Smith. Stem 3-10 dm. high, glabrous; leaf-blades 5-20 cm. long, 1-2 mm. wide, involute or rarely flat; spikes 8-20 cm. long, spikelets 3-6-flowered, flattened; lemma 8-10 mm. long, scabrous above; awn stout, 12-25 mm. long *A. divergens* Nees. BUNCH GRASS. Dry rocky hills and bench-lands: B.C.—Calif.—Ariz.—Colo.—Mont. *Plain*—*Submont.* Je-Au

5. **A. arizonicum** Scribn. & Smith. Tufted, but occasionally with long stolons; stem 4-6 dm. high, minutely scabrous below; leaf-blades 1-3.5 dm. long, 4-6 mm. wide; spike 7-20 cm. long, usually nodding; spikelets 7-14, distant, 5-7-flowered, 2-3.5 cm. long, 3-5-nerved; lemma 10-15 mm. long, acuminate, scabrous; awn about 2.5 mm. long. Mountains: Colo.—N.M.—Ariz.; n Mex. *Submont.*—*Subalp.* Au-O.

6. **A. Bakeri** E. Nels. Stem smooth, 3-5 dm. high; leaf-blades rigid, flat, 1-3 dm. long, 2-4 mm. wide; spike 9-12 cm. long, dense, scarcely exerted; spikelets about 5-flowered, 15-19 mm. long; empty glumes 11-12 mm. long, scarious-margined, abruptly acuminate, short awned; lemma scabrous or nearly smooth, about 12 mm. long, attenuate; awn 1-3.5 cm. long. High mountains: Colo.—N.M. *Mont.* Au.

7. **A. Richardsonsii** (Trin.) Schrad. Stems smooth, 6-8 dm. high; leaf-blades 8-20 cm. long, 2-6 mm. wide, scabrous, flat, often with involute tips; spikes 7-10 cm. long, one-sided; spikelets 3-4-flowered; empty glume 12-16 mm.

long, short-awned or awn-pointed; lemma 10-13 mm. long, scabrous on the margins. *A. unilaterale* Cassidy, not Beauv. Searcely distinct from *A. caninum* L. of Eu Meadows and among bushes Sask.—Minn.—Iowa—N.M.—B.C. Plain—Mont. Je-S.

8. *A. caninoides* (Ramaley) Reel Stem 3-10 dm high; leaf-blades 1.5-3 dm. long, 3 mm wide, erect, involute or nearly flat; spike 1-2 dm long, dense; spikelets 1-2 cm. long, pale or purple-tinged; empty glumes 7-9 mm. long, short-awned or awn-pointed; lemma 7 mm long, scabrous. *A. caninum* Arn. auth, mostly. Mountain meadows: N.S.—Mich.—N.M.—Calif.—Mont. Mont. —Subalp. JI-Au.

9. *A. andinum* (Scribn. & Smith) Rydb. Stems 2-3.5 dm high; leaf-blades 2-10 cm. long, 2-4 mm. wide, flat, glabrous beneath, pilose above, spike 3-8 cm. long; empty glumes 8-10 mm. long; lemma 8-10 mm long, puberulent or glabrate; awn 4-10 mm. long. High mountains Mont.—Colo. Mont.—Subalp. JI-Au.

10. *A. latiglume* (Scribn. & Smith) Rydb. Stems 2-4 dm high, erect or often decumbent at the base; leaf-blades 3-10 cm. long, 2-4 mm wide, flat, or involute when dry, pubescent on both sides or sometimes glabrate; spike 3-5 cm long; spikelets 3-5-flowered; lemma oblanceolate, acute or short-awned. High mountains: Alta.—Mont.—Alaska. Subalp.—Alp.

11. *A. biflorum* (Brign.) R. & S. Tufted perennial; stem 1.5-6 dm. high, often somewhat decumbent at the base; leaf-blades 5-15 cm long, 2-6 mm. wide, flat or somewhat involute; spike 2.5-10 cm. long, 4-6 mm. wide; spikelets 3-6-flowered; lemma 5-7-nerved, 8-12 mm. long, acuminate or short-awned. *A. violaceum* (Hornem.) Lange. Mountains: Greenl.—N.Y.—Neb.—N.M.—Alaska; Eurasia. Subalp.—Alp. JI-S.

12. *A. tenerum* Vasey. Stem 3-10 dm. high; leaf-blades 2-6 mm wide, 7-15 cm long, scabrous, flat or involute; spike slender, 1-1.5 dm. long, lax; spikelets 3-5-flowered; empty glumes 10-12 mm long, acute to awn-pointed, 5-nerved; lemma 8-10 mm. long, lanceolate; awn 1-4 mm. long or more. RYE GRASS. Dry soil: B.C.—Calif.—N.M.—Minn. Plain—Submont. Je-Au.

13. *A. inerme* (Scribn. & Smith) Rydb. Stems 3-10 dm high, glabrous; leaf-blades erect, 1-2 dm. long, 2-4 mm. wide, more or less pubescent above, somewhat glaucous, flat or involute; spike 1-3 dm long, lax; spikelets distant, 1.5-2 cm. long, 6-10-flowered; empty glumes 8-10 mm. long; lemma 10-12 mm. long, smooth, often mucronate or with a short awn-tip. Closely related to *A. spicatum* and *A. Vaseyi*. Plains and meadows: B.C.—Wash.—Utah—Wyo. Submont. Je-Au.

14. *A. albicans* Scribn. & Smith. Stem erect, 3-6 dm high, glaucous; leaf-blades rigid, ascending, involute, scabrous, 7-20 cm. long, 2-3 mm. wide, spike slightly nodding, 7-10 cm long; spikelets 8-10, 5-7-flowered, 15-18 mm long; empty glumes pubescent, oblanceolate, acuminate, tipped with an awn 4-6 mm long; lemma about 9 mm. long, ovate-lanceolate; awn 12-15 mm. long. Hills and benchlands. Mont.—Wyo.—w. Neb.—S.D. Submont. Je-Au.

15. *A. Griffithsii* Scribn. & Smith. Stem glabrous, 3-8 dm. high, striate, leaf-blades rather rigid, mostly involute, 5-12 cm. long; spike erect, 8-15 cm long; spikelets pale, closely 5-7-flowered; empty glumes 8 mm long, with awns 3 mm. long; lemma oblong, 8-10 mm. long; awns 8-10 mm. long. Plains: Wyo.—N.D.—S.D. Plain. Au.

16. *A. Palmeri* (Scribn. & Smith.) Rydb. Stem 3-6 dm. high; leaf-blades glaucous, 1-2 dm. long, 3-4 mm. wide, at last involute, scabrous and often sparingly pubescent on both sides; spikes rather dense, 1-1.5 dm. long; spikelets compressed, 1.5-2 cm. long; lemma about 1 cm. long, acuminate, pilose to hispidulous-scabrous. Bottom-lands and hillsides: N.M.—Colo.—Utah—Ariz. Son.—Submont. My-JI.

17. *A. pseudorepens* Scribn. & Smith. Stem 3-10 dm. high, glabrous; leaf-blades scabrous throughout, 12-20 cm. long, 2-6 mm wide, flat, or involute when dry; spike 1-2.5 dm. long; spikelets rather distant, 10-16 mm. long, 3-7-

flowered; lemma acuminate or awn-pointed, scabrous, about 1 cm. long. Prairies and river valleys Neb.—Tex.—Ariz.—B.C. *Plain—Mont.* Je-S.

18. *A. riparium* Scribn. & Smith. Stem glabrous, erect, 4-6 dm. high; leaf-blades flat, becoming involute, 5-15 cm. long, 2-4 mm. wide, scabrous throughout, spike 5-10 cm. long; spikelets 8-15, compressed, 5-7-flowered, spreading, 5-6 mm. long; lemma oblong-lanceolate, acute, scabrous towards the apex, acute or acuminate. River banks: Mont—Colo. *Submont.*

19. *A. Smithii* Rydb. Stem 3-10 dm. high; leaf-blades spreading, rigid, bluish green, glaucous, smooth or minutely scabrous beneath, becoming involute, 1-3 dm. long, 4-6 mm. wide; spikes 7-18 cm. long; spikelets 7-13-flowered, sometimes in pairs; lemma 8-12 mm. long, lanceolate, acute or acuminate, seldom awn-pointed, smooth or nearly so. *A. spicatum* Scribn. & Smith, in part. *A. occidentale* Scribn. BLUE-JOINT; BLUE-STEM. Prairies and plains: Man.—Mo.—Tex.—Ariz.—Ore.—B.C. *Plain—Mont.* Je-S.

20. *A. molle* (Scribn. & Smith) Rydb. Stems 4-8 dm. high; leaf-blades more or less glaucous, 1-3 dm. long, 2-4 mm. wide, at last involute, scabrous; spike 1-2 dm. long, rather dense; spikelets about 2 cm. long, 6-8-flowered; lemma 8-10 mm. long, densely hispidulous. River bottoms, especially in alkaline soil: Sask.—N.M.—Utah—Wash. *Plain—Mont.* Jl-S.

21. *A. lanceolatum* Scribn. & Smith. Stem 6-10 dm. high, smooth and shining, leaf-blades acuminate, 12-30 cm. long, 4-6 mm. wide, flat, scabrous beneath, pilose above; spike 1-2 dm. long; spikelets 10-20 mm. long, 4-7-flowered, erect, lemma 8-15 mm. long, broadly lanceolate, more or less short-pubescent. Banks and meadows: Wash—Ida—Ore. Je-Jl.

22. *A. subvillosum* (Hook.) E. Nelson. Stems 4-6 dm. high, slender, glabrous, leaf-blades 1-2 dm. long, 2-4 mm. wide, flat or at last involute, scabrous; spike rather crowded; spikelets compressed, 12-15 mm. long; lemma 6-10 mm. long, obtuse or acute. River banks and sandy soil: Sask.—Neb.—Colo.—Nev.—B.C. *Plain—Mont.* Je-Au.

23. *A. dasystachyum* (Hook.) Scribn. Stem 3-10 dm. high; leaf-blades 5-20 cm. long, 2-6 mm. wide, flat, becoming involute in drying; spike 6-18 cm. long; spikelets slightly compressed, 4-8-flowered; lemma broadly lanceolate, 10-12 mm. long, acute or rarely short-awned. Sand-dunes: Hudson Bay—Mich.—Wis—Ida—Sask. *Plain—Boreal* Jl-Au.

73. TRITICUM L. WHEAT

Annuals or biennials with spicate inflorescence. Spikelets solitary at each node, alternate, 2-5-flowered; flowers mostly perfect. Empty glumes with one edge towards the rachis, broad, short, often toothed, but seldom awned at the apex. Lemma ventricose on the back, several-nerved, often awned or at least toothed at the apex. Palea shorter than the lemma, 2-keeled. Grain deeply furrowed, free, pubescent at the apex.

Empty glumes distinctly keeled only at the apex, grain dull, neither glossy nor semi-translucent. 1 *T. aestivum*.

Empty glumes distinctly keeled, almost winged, to the base; grain glossy, often somewhat translucent. 2 *T. durum*.

1. *T. aestivum* L. Annual or biennial; stem about 1 m. high, hollow, smooth; leaves at first rather light green, soft; spike 4-12 cm. long, 4-angled; spikelets mostly 4-flowered; lemma with or without awn. *T. sativum* Lam. WHEAT. Old fields and waste places: cult. and rarely escaped.

2. *T. durum* Desf. Annual or rarely biennial; stem 1 m. high or more, usually with a pith; leaves smooth, whitish green, with hard cuticle; spike almost terete, thicker than in the ordinary wheat, 5-10 cm. long; lemma long-awned. DURUM or MACARONI WHEAT. Old fields and waste places: cult. and rarely escaped.

74. SECALÉ L. RYE.

Annuals or biennials, with spicate inflorescence. Spikelets solitary at each node, alternate, 2-flowered. Flowers all hermaphrodite and fertile. Empty glumes subulate, awn-pointed, with one edge towards the rachis. Lemma long-

awned at the apex, keeled to the base. Grain slightly compressed laterally, deeply furrowed, free, pubescent at the apex.

1. **S. cereale** L. Annual or biennial; stem 1.5–3 m. high, glabrous; leaves scabrous, flat; spike 10–15 cm. long, 4-angled; spikelets 2-flowered, empty glumes subulate; lemma lanceolate, hispidulous-ciliate, 5-nerved, awned. Waste places and old fields: escaped from cultivation.

75. **HORDEUM** L. BARLEY, SQUIRREL-TAIL, FOXTAIL

Annuals or rarely perennials, with spicate inflorescence. Spikelets alternately in 3's, rarely in 2's, at each node of the articulate rachis, sessile or short-pedicelled, 1-flowered; flower perfect or in the lateral spikelets often imperfect or rudimentary; rachilla extending beyond the flower as a long slender bristle. Empty glumes 2, awnlike, subulate, or lanceolate, rigid, falling together with the rachilla-joint. Lemma lanceolate, rounded on the back, awned, lobed, or in the lateral spikelets awnless. Palea shorter, 2-keeled. Styles very short, distinct, stigmas plumose.

Lateral spikelets sessile, annuals

Lemma not awned, the awns represented by chartaceous lobes

1 *H. aegiceras*.

Lemma awned

2 *H. vulgare*

Lateral spikelets stalked, lemma awned

Floret of the central spikelet sessile

Empty glumes of the central spikelets lanceolate

3 *H. pusillum*.

Empty glumes of central spikelet not lanceolate

Inner empty glumes of the lateral spikelets broadened

4 *H. maritimum*.

Empty glumes all setaceous

Lateral floret not awned

Plant low, 5–25 cm. high, upper sheaths inflated

5 *H. depressum*

Plant taller, 2–6 dm. high, upper sheath not conspicuously inflated

Lateral floret neutral or staminate, lemma of the central floret 6–8

mm long

6 *H. nodosum*

Lateral floret usually perfect, lemma of the central flower 10 mm

long

7 *H. boreale*

Lateral florets long-awned

Awn 2–3 cm. long

8 *H. caespitosum*

Awn 4–6 cm. long

9 *H. jubatum*

Floret of the central spikelets stalked

Empty glumes not ciliate

10 *H. montanense*

Empty glumes or some of them ciliate

11 *H. murinum*

1. **H. aegiceras** (E. Mey.) Royle. Stem 5–7 dm. high; leaf-blades glabrous, 1–1.5 cm. broad; spikes about 1 dm. long; spikelets all fertile, empty glumes lance-subulate, strigose; lemma 3-lobed at the apex; lateral lobes lanceolate, acute, divergent; middle lobe ovate, obtuse, slightly hooded. PEARL BARLEY. Moist waste grounds: cult. and often escaped. *Plain—Submont.*

2. **H. vulgare** L. Annual or rarely biennial, stem 5–7 dm. high, leaf-blades broad, flat; ligules obsolete; spikes about 1 dm. long; empty glumes small, subulate, awned; spikelets all hermaphrodite; lemma lanceolate, long-awned, smooth BARLEY. Waste places and old fields. sometimes escaped from cultivation.

3. **H. pusillum** Nutt. Tufted annual; stem 1–4 dm. high, usually decumbent at the base; leaf-blades 1–7 cm. long, 1–4 mm. wide; spike 3–7 cm. long, central spikelets perfect, the lateral ones imperfect; inner empty glumes of the lateral spikelets lanceolate, the outer ones subulate, all awned; lemma smooth, that of the central spikelet 6–8 mm. long, short-awned, those of the lateral spikelets smaller and stalked. Dry soil: Ont.—Ga.—Calif.—B.C. *Plain—Submont.* Ap-Je.

4. **H. maritimum** With. Annual or perennial, branched at the base, branches decumbent below, then ascending, somewhat geniculate, 1–2 dm. high, sheaths loose, pubescent; spike short-exserted or the base included, 3–5 cm. long, empty glumes setaceous except the inner ones of the lateral spikelets, which are sometimes staminate, distinctly awned; otherwise like *H. nodosum*. Saline soil. Calif.—Wash.—Ida.—Utah. My-Jl.

5. **H. depressum** (Scribn. & Smith) Rydb. Tufted; stem 5–15 cm. high, geniculate at the base, which is covered by the sheaths; leaf-blades 1–3 cm. long, 1–3 mm. wide, auricled at the base, finely pubescent; spikes 2–3 cm. long; lemma

of the central spikelet 7 mm. long, smooth; awn of about the same length; lemma of the lateral spikelets about 4 mm. long, acuminate or merely awn-pointed. *H. nodosum depressum* Scribn. & Smith. Meadows: Wash.—Ida.—Calif. *Submont.* My-Je.

6. *H. nodosum* L. Tufted annual or perennial; stems 2-6 dm. high, erect or sometimes decumbent at the base; leaf-blades 4-12 cm. long, 2-6 mm. wide, scabrous; spike 3-8 cm. long; lemma of the central spikelet 6-8 mm. long; awn 6-12 mm. long; lemma of the lateral spikelets smaller. Meadows and waste places: Alaska—Calif.—Tex.—Yukon; Eu. *Submont.*—*Mont.* Ap—Au.

7. *H. boreale* Scribn. & Smith. Rather simple perennial; stem 3-10 dm. high, lower sheaths often pubescent; leaf-blades 1-2.5 dm. long, 4-8 mm. wide, scabrous; spikes 7-10 cm. long; lemma of the central spikelet scabrous toward the apex; awn about 1 cm. long; lemma of the lateral spikelets about 6 mm. long, subulate-pointed. Meadows: Alaska—Calif.—Ida.—Colo. (?) *Submont.* Je—Jl

8. *H. caespitosum* Scribn. Cespitose perennial; stem 3-6 dm. high, smooth, leaf-blades 5-15 cm. long, 3-5 mm. wide; spike 3-5 cm. long; lemma of the central spikelet lanceolate, 6 mm. long; awn about 12 mm. long; lemma of the lateral spikelets 2-4 mm. long, with an awn of about the same length. Meadows and springy places: Sask.—S D.—Kans.—N.M.—Ida.—Wash. *Plain—Submont.* Je—Au.

9. *H. jubatum* L. Tufted perennial; stem 2-8 dm. high, erect; leaf-blades 3-12 cm. long, 2-4 mm. wide, scabrous; spikes 5-10 cm. long; lemma of the central spikelet 6-8 mm. long, scabrous at the apex; awn 4-6 cm. long; lemma of the lateral spikelets 4-6 mm. long, short-awned. Dry sandy soil and prairies: Lab.—N J.—Tex.—Calif.—Alaska. *Plain—Subalp.* Je—S.

10. *H. montanense* Scribn. Erect biennial or perennial; stem 6-10 dm. high, smooth; spike 5-7 cm. long; leaf-blades 5-10 cm. long, 4-6 mm. wide, scabrous; central spikelets usually 2-flowered; lemma of the first flower about 1 cm. long, lanceolate, scabrous; awn 16-18 mm. long; lemma of the second flower with the awn 12-14 mm. long; lateral spikelets similar to the central one, but the second flower rudimentary. Meadows: *Mont.* *Submont.*

11. *H. murinum* L. Tufted perennial; stem 2-6 dm. high, erect or decumbent at the base; leaves 3-15 cm. long, 2-6 mm. wide, scabrous; spikes 5-10 cm. long; empty glumes of the central spikelet lance-subulate; outer glumes of the lateral spikelets setaceous and merely scabrous; awns 18-25 mm. long; lemma 10-12 mm. long, scabrous toward the apex; awns about 25 mm. long. Ballast and waste places. Calif.—B.C.—Ida.—N.M.; also along the eastern coast. N.Y.—D.C.; adv. and nat. from Eu. *Son.—Submont.* My—Au.

76. SITÄNION Raf.

Tufted perennials, with cylindric, spicate inflorescence. Spikelets sessile, several at each node of the articulate rachis, 1-5-flowered. Empty glumes 2, rarely entire, awn-like, usually 2-5-cleft with subulate awned divisions. Lemma broader, entire, long-awned, or 2- or 3-cleft and short-awned. Palet shorter than the glume, 2-keeled. Styles very short, distinct; stigmas plumose.

Empty glumes lanceolate, scarious-margined.

Leaf-blades not white-margined

1. *S. lanceolatum.*

Leaf-blades white-margined

2. *S. marginatum.*

Empty glumes setaceous, or cleft into setaceous divisions, not scarious-margined.

Empty glumes setaceous, entire, lowest flower perfect.

3. *S. pubiflorum.*

Lemma soft-pubescent

4. *S. elymoides.*

Lemma glabrous.

Empty glumes or some of them 2-cleft; lowest flower rudimentary

Lemma pubescent; sheaths and blades densely pubescent.

Blades and sheaths short-hairy, subvelutinous.

5. *S. hystrix.*

Awns at least 4 times as long as the lemma

6. *S. cinereum*

Awns 2-3 times as long as the lemma.

7. *S. ciliatum*

Blades and sheaths long-hairy.

Lemma glabrous or scabrous.

Empty glumes subulate-lanceolate, bifid about two-thirds their length.

8. *S. insulare*

- Empty glumes setaceous, or cleft to near the base into setaceous divisions.
 Sheaths and blades more or less long-pubescent.
 Lemma glabrous 9 *S. molle*.
 Lemma scabrous 10 *S. strigosum*
 Sheaths and blades glabrous, scabrous, or puberulent, lemma smooth
 below, scabrous above
 Awns of the lemma 3-4 cm. long, divergent; plant very low
 11 *S. rigidum*
 Awns of the lemma 4-7 cm. long; plant taller, more than 2 dm. high.
 Leaf-blades 2-5 mm. broad, flat or slightly involute
 Plant perfectly glabrous; awn ascending 12 *S. glabrum*
 Plant puberulent or scabrous, awns divergent 13 *S. montanum*.
 Leaf-blades 1-2 mm. broad, strongly involute. 14. *S. basalticola*.

1. *S. lanceolatum* J. G. Smith. Stem 3-5 dm. high, erect, smooth; leaf-blades 8-15 cm. long, 2-3 mm. wide, rigid; spikes erect, 6-10 cm. long, barely exserted; empty glumes 5-6 mm. long, usually 2-nerved, entire or unequally 2-cleft, the longer awn scabrous, divergent, 1-1.5 cm. long; lemma 8-9 mm. long, glaucous, entire or minutely 3-cleft; awns spreading, 2-5 cm. long. *Agropyron stanioides* J. G. Smith. Mountains: Mont.—S.D. *Submont.* Au.

2. *S. marginatum* Scribn. & Merrill. Stem 2-3 dm. high; leaf-blades 3-9 cm. long; spike 3-6 cm. long; empty glumes 5 mm. long, entire; awn spreading, about 1.5 cm. long; lemma glabrous, about 7 mm. long, awn like those of the empty glumes. Bare mountain slopes: Wyo. *Subalp.* Jl.

3. *S. pubiflorum* J. G. Smith. Stem erect, 2-3 dm. high, strigose above; leaf-blades puberulent beneath, scabrous above, 2-10 cm. long, spreading, spike exserted, 5 cm. long; empty glumes 4-6 cm. long; lemma of the lowest flower 7 mm. long, scabrous and finely pubescent; awn scabrous, straight, ascending, 5-6 cm. long. Dry hills: Colo.—N.M.—Ariz. *Son.* Ap-Je.

4. *S. elymoides* Raf. Stem 3-6 dm. high, glabrous and glaucous; leaf-blades smooth and glaucous or puberulent, 1-2 dm. long, 2-4 mm. wide, flat or involute; spike somewhat nodding, exserted or enclosed at the base in the uppermost sheath; empty glumes 6-8 cm. long; lemma 8-11 mm. long; awn scabrous, spreading, 5-6 cm. long. *S. longifolium* and *S. brevifolium* J. G. Smith. Hill-sides and plains: Neb.—Kans.—N.M.—Ariz.—Nev.—Mont. *Plain—Mont* Je-S.

5. *S. Hystrix* (Nutt.) J. G. Smith. Stems 1-3 dm. high, erect, scabrous above; leaf-blades flat or at length involute, finely pubescent throughout, 2-12 cm. long, 1-2 mm. wide; spike 5-7 cm. long, erect, flexuose; empty glumes scabrous, 3-4 cm. long; lemma 7-8 mm. long, minutely pubescent, 3-awned, the middle awn about 3 cm. long. Dry hills and "sage plains": Colo.—Wyo.—Wash.—Ore. *Son.—Submont.* My-Jl.

6. *S. cinereum* J. G. Smith. Stem 2-3 dm. high, densely grayish pubescent; leaf-blades involute, rigid; spike 4-5 cm. long; awns 2-3 cm. long; lemma 7-8 mm. long, scabrous, 3-nerved towards the apex, 3-awned; lateral awns 2-4 mm. long, the middle one 2-3 cm. long. Dry places: Wash.—Ida.—Nev. *Son.* My-Jl.

7. *S. ciliatum* Elmer. Stem 1-2 dm. high, cinereous-pubescent just below the spike; leaf-blades 5-10 cm. long, finely pilose, 3-4 mm. wide; spikes 5-7 cm. long; empty glumes about 1 cm. long, gradually tapering into a divaricate awn, 3-4 mm. long; lemma 8 mm. long, pubescent or scabrous on the nerves, awn 3-4 cm. long. Hills: Wash.—Wyo. *Submont.* Je.

8. *S. insulare* J. G. Smith. Stem slender, glabrous, 3-6 dm. high; leaf-blades 1-1.5 dm. long, glabrous below, pubescent on the veins above, involute; empty glumes 2-awned; awns divergent, scabrous, 1-2 cm. long; lemma 8 mm. long, smooth and shining, 3-cleft; middle awn divaricate, 1-2 cm. long; lateral awns or teeth 1-2 mm. long. Arid places: Utah. *Son.* Je.

9. *S. molle* J. G. Smith. Stem 3-4 dm. high, pubescent; leaf-blades rigid, ascending, 8-15 cm. long, 3-5 mm. wide; spike 7-8 cm. long, erect, exserted; empty glumes 4, entire or unequally bifid, subulate-setaceous, 6-7.5 cm. long,

divaricate; lowest flower of the spikelet sterile, like the empty glumes; lemma of the second flower about 1 cm. long, trifid or entire; awn 5-7 cm. long. Mountain sides: Colo.—N.M. *Submont.*—*Subalp.* Au.

10. *S. strigosum* J. G. Smith. Stem 3-6 dm. high, glabrous or minutely pubescent above; leaf-blades 1-2.5 dm. long, 3-6 mm. wide, flat, or the lower involute, pilose, spike stout, exserted, 8-12 cm. long; empty glumes entire or bifid, subulate-setaceous, 5-6 cm. long; lemma 8-10 mm. long, 3-cleft above, the middle awn 5-7 cm. long, the lateral ones 1-2 mm. long. Valleys: Wash.—Ore.—N.D.—S.D. *Submont.* Je—Au.

11. *S. rigidum* J. G. Smith. Stem 1-2 dm. high, glabrous; leaf-blades 3-8 cm. long, 2-3 mm. wide, rigid, involute, scabrous above; spike 2-8 cm. long, exserted or included at the base; empty glumes 4, entire or two of them divided to the base, awned, strongly divaricate, 2-3 cm. long; lowest floret usually sterile, lemma 7-9 mm. long, trifid; awn stout, divaricate. Mountains: Calif.—Wash.—Mont.—N.M.—Ariz. *Subalp.*—*Alp.* Je—Au.

12. *S. glabrum* J. G. Smith. Stem 3-6 dm. high, smooth and shining; leaf-blades 7-15 cm. long, 2-5 mm. wide, flat, becoming involute; spike 5-8 cm. long, sub-flexuose, the base usually enclosed in the uppermost sheath; empty glumes bifid to near the base, the lobes subulate-setaceous, 6-8 cm. long; lemma 7-8 mm. long, entire or minutely bifid. Hills. Calif.—Wash.—Wyo.—Utah *Subalp.*—*Alp.* My—Au.

13. *S. montanum* J. G. Smith. Stem 2-4 dm. high, glabrous below, scabrous above; leaf-blades 5-10 cm. long, 3-4 mm. wide; spike erect, 5-10 cm. long; empty glumes subulate-setaceous, some of the lower usually bifid, divergent, 5-6 cm. long; lemma 10-11 mm. long, 3-fid, 3-awned. Hillsides: Mont.—Wyo.—Utah—Ore. *Submont.*—*Mont.* Je—Au.

14. *S. basalticola* Piper. Stem 1-3 dm. high, smooth; leaf-blades 3-10 cm. long, 1-2 mm. wide, minutely scabrous on the nerves above; spike erect, 3-5 cm. long, barely exserted, empty glumes subulate, or some cleft to near the base, spreading, 3-4 cm. long; lemma 8-10 mm. long, glabrous, glaucous, 3-fid; middle awn 3-3.5 cm. long, divergent, scabrous, the lateral ones about 1 mm. long. Basaltic soil and sandy slopes. Wash.—Ida. *Submont.* Je.

77. *ELÝMUS* L. LYME-GRASS, WILD RYE, RYE-GRASS, BUFFALO RYE.

Perennials, with rootstocks and cylindric spikes. Spikelets sessile, usually 2 or 3 at each node, but in some species mostly single, 2-several-flowered. Empty glumes 2, inserted more or less obliquely, rigid, awn-like, subulate or lance-linear, persistent, awn-pointed or awned. Lemma oblong or lanceolate, rounded on the back, usually awned. Palea shorter than the glume, 2-keeled. Styles very short, distinct; stignas plumose.

Lemma long-awned

Spike broad, spikelets spreading

Empty glumes lanceolate to lanceolate-subulate, spike dense

Empty glumes lanceolate, 5-7-nerved, thick and strongly curved at the base, spike erect

Plant robust, spike scarcely exserted, lemma glabrous or nearly so

1 *E. virginicus*.

Plant slender, spike long-exserted, lemma scabrous-hispidulous

2 *E. jejunos*.

Empty glumes narrowly linear-lanceolate, neither conspicuously thickened nor curved at the base, spike often nodding

Empty glumes usually minute, less than 15 mm. long. 4. *E. diversiglumis*.

Empty glumes 15-30 mm. long

Lemma hirsute or villous

3 *E. canadensis*.

Lemma hispidulous-scabrous to glabrous

Robust; spike usually included at the base, leaf-blades 8-15 mm

wide

5 *E. robustus*

Slender, spike long-exserted; leaf-blades seldom more than 5 mm.

wide

6. *E. brachystachys*.

Empty glumes setaceous, hirsute, lemma hirsute, spike laxer

7. *E. striatus*.

Spike narrow, spikelets erect, appressed.

Lemma pubescent

Empty glumes lanceolate, 5-nerved.

8. *E. vulpinus*.

Empty glumes lance-subulate, indistinctly veined

9. *E. angustus*.

- Lemma scabrous or glabrous**
 Empty glumes lanceolate, acuminate or short-awned, 2-5-nerved
 Spike dense; spikelets more or less imbricate
 Plants not tufted, with rootstocks, leaf-blades spreading.
 Sheaths and blades glabrous; glumes scabrous, at least above
 10. *E. glaucus*
 Sheaths and lower leaf-blades pubescent; glumes glabrous
 11. *E. marginalis*
 Plants tufted, leaf-blades ascending
 12. *E. nitidus*
 Spike lax, spikelets distant; glumes glabrous
 13. *E. Petersonii*
 Empty glumes linear-subulate.
 Spike 7-8 mm thick, awns 30-40 mm long
 14. *E. Saundersii*
 Spike 5 mm thick, awns 5-10 mm. long
 15. *E. Macounii*
Lemma awnless or short-awned; awn less than one-third the length of the body.
 Empty glumes strongly 3-5-nerved.
 Empty glumes thickened and strongly curved at the base, not scarious-margined
 16. *E. curvatus*
 Empty glumes neither thickened nor strongly curved at the base, more or less scarious-margined
 17. *E. Howellii*
Empty glumes 1-nerved or indistinctly 3-nerved
Lemma glabrous or hispidulous
 Empty glumes aristiform or narrowly subulate
 Plant stout, 1-2 m. high, tufted, spikelets 2-6 at each joint, lemma scarious-hispidulous
 18. *E. condensatus*
 Plant slender, 3-10 dm. high, spikelets 1 or 2 at each joint
 Lemma broadly lanceolate, acute or awn-pointed, rachis scabrous on the sharp angles, spikelets erect, plant with a horizontal rootstock
 19. *E. triticoides*
 Lemma narrowly lanceolate, rachis nearly terete, strigose, plant tufted
 Spikelets usually in pairs, lemma awn-pointed.
 Lemma glabrous
 20. *E. ambiguus*
 Lemma scarious or scarious-strigose
 21. *E. strigosus*
 Spikelets usually singly, lemma acuminate or acute
 22. *E. salinus*
 Empty glumes lanceolate-subulate, tapering from the rather broad base, lemma glabrous
 23. *E. simplex*
Lemma pubescent
 Plants tufted, lemma long-attenuate, short-awned
 24. *E. rilliflorus*
 Plants not tufted, or somewhat so in *E. cinereus*, with horizontal rootstocks, lemma not long-attenuate
 Lemma appressed-pubescent
 Stem, sheath, and leaves glabrous or minutely strigulose
 25. *E. arenicola*
 Stem, sheath, and leaves densely short pubescent.
 26. *E. cinereus*
 Lemma with spreading pubescence
 Spike long, empty glumes lanceolate, silky-villous
 27. *E. flavescens*
 Spike short, empty glumes subulate, scarious.
 28. *E. innovatus*

1. ***E. virginicus*** L. Stem 6-10 dm. high, sheath usually glabrous; leaf-blades 1-3 dm. long, 4-16 mm. wide, scarious, spike 5-15 cm. long, thick, erect, lemma 6-8 mm. long, glabrous; awn scarious, 5-18 mm long. Along streams N.S.—Fla.—Tex.—Sask. *Plain*. Je—Au.

2. ***E. jejunos*** (Ramaley) Rydb. Stem slender, 3-6 dm. high; leaf-blades 1-2 dm. long, 2-5 mm. wide, scarious; spike 2-6 cm. long, strict; spikelets usually 2 at each node; lemma lanceolate, 7-8 mm. long, scarious, hispidulous; awn 3-10 mm. long. *E. virginicus minor* Vasey. *E. virginicus jejunos* Ramaley. Sand hills and river banks: Minn.—Neb.—Wyo.—Mont. *Plain—Submont.* Je—Au

3. ***E. diversiglumis*** Scribn. & Ball. Stem 9-12 dm. high, glabrous; leaf-blades spreading, 1.5-2.5 dm. long, 6-12 mm. wide, scarious on both sides, spikelets in pairs, 2-flowered; lemma linear-lanceolate, acute, 8-10 mm. long, indistinctly 3-5-nerved, hirsute or scarious, hispidulous; awn 2-3 cm. long. Rich open places: Wis.—Wyo.—N.D. *Plain—Submont.* Jl

4. ***E. canadensis*** L. Stem 6-15 dm. high, glabrous; leaf-blades 1-3 dm. long, 4-20 mm. wide, scarious; spike 1-3 dm. long, usually long-exserted, nodding; spikelets spreading, 3-5-flowered; lemma 8-14 mm. long; awn 2-5 cm. long, rough. River banks and among bushes: N.S.—Ga.—N.M.—B.C. *Plain—Submont.* Jl—Au.

5. ***E. robustus*** Scribn. & Smith. Stem 1-2 m. high, smooth; leaf-blades 2-4 dm. long, 8-20 mm. wide, scarious on both sides; spike 12-18 cm. long, 2.5-4 cm. thick; spikelets 3-4 at the nodes, 3-4-flowered; lemma 12-16 mm. long,

attenuate above; awn 3-4 cm. long. River valleys: Ill.—Mo.—N.M.—Mont.—Ida. *Plain—Submont.* Je—Au.

6. *E. brachystachys* Scribn. & Ball. Stem 3-10 dm. high, smooth; leaf-blades 1-2 dm. long, 6-10 mm. wide, semi-involute, smooth or somewhat scabrous beneath, finely scabrous above; spike dense, nodding, 8-15 cm. long; spikelets usually in 2's, 3-5-flowered; lemma 11-13 mm. long; awn scabrous, 2-4 cm. long. Prairies and plains: Mich.—Tex.—N.M.—(Black Hills) S.D.; Mex. *Plain—Submont.* Je—Au.

7. *E. striatus* Willd. Stem 3-9 dm. high; leaf-blades 1-2 dm. long, 4-10 mm. wide, smooth or slightly scabrous beneath, pubescent above; spike exserted, nodding, 6-12 cm. long; spikelets divergent, 1-3-flowered; lemma about 6 mm. long, hispid; awn 1.5-3 cm. long. Woods and river banks: Me.—N.C.—Tex.—N.D. *Plain—Submont.* Je—Au.

8. *E. vulpinus* Rydb. Stem 5-7 dm. high, striate, erect; leaves 1-1.5 dm. long, 2-6 mm. wide, scabrous on the margins; spike exserted, 1-1.5 dm. long, 6-7 mm. thick, slightly nodding; spikelets 1-2 at each node, 4-6-flowered; lemma linear-lanceolate, 8 mm. long; awn 8-10 mm. long. Meadows: Alta.—Neb. *Plain.* Jl—Au.

9. *E. angustus* Trin. Stem 4-10 dm. high, striate, smooth; leaf-blades rigid, 7-15 cm. long, 3-6 mm. wide, smooth beneath, scabrous above, with involute margins; spike rather slender, its base enclosed in the upper sheath; spikelets in pairs, 2-3-flowered, erect-appressed; lemma lanceolate, acuminate, 8-10 mm. long; awn scabrous, 4-6 mm. long. Banks: Wyo.—Ida.; Asia. *Submont.* Je.

10. *E. glaucus* Buckley. Stem 6-10 dm. high, smooth; leaf-blades flat, scabrous on both sides, 6-15 mm. wide, 5-20 cm. long; spike erect, 6-15 cm. long, 5-8 mm. thick; spikelets in pairs, rarely in threes or single, 3-4-flowered; lemma scabrous towards the apex, 5-nerved, 7-10 mm. long, with a white margin, or in var. *tenuis* Vasey [*E. americanus* Vasey & Scribn.] narrower and with purplish margin; awn scabrous, 7-15 mm. long. Among bushes and in meadows: Mich.—N.M.—Calif.—B.C. *Submont.—Subalp.* Je—Au.

11. *E. marginalis* Rydb. Stem 6-10 dm. high, glabrous or pubescent at the nodes; leaf-blades 1-2 dm. long, 7-10 mm. wide, flat, scabrous beneath, usually pilose above; spike 1.5-2 dm. long; spikelets usually in pairs, 4-5-flowered; lemma 10-12 mm. long, glabrous and shining; awns 8-20 mm. long. Lake shores and banks. B.C.—Wash. *Submont.—Mont.* Je—Jl.

12. *E. nitidus* Vasey. Stem 7-10 dm. high, stout and leafy; leaf-blades 1.5-2 dm. long; spike about 1 dm. long, erect; spikelets 1-2 at each node, 3-5-flowered; lemma about 1 cm. long, obscurely 5-nerved, smooth or nearly so, shining; awn scabrous, of about the same length. Mountains. Ore.—Wyo.—B.C. *Submont.—Mont.* Jl—Au.

13. *E. Petersonii* Rydb. Stem 6-8 dm. high, slender, glabrous; leaf-blades flaccid, 1-1.5 dm. long, 4-5 mm. wide, light green, minutely scabrous on both sides, or sparingly pilose above; spikelets in pairs or single; lemma about 1 cm. long; awn about 1 cm. long. Mountains: B.C. (Selkirk Mts.) *Mont.* Au.

14. *E. Saundersii* Vasey. Stem 6-10 dm. high, smooth; leaf-blades 12-20 cm. long, becoming involute, finely scabrous; spike 12-18 cm. long, somewhat nodding; spikelets usually in pairs, 2-4-flowered; lemma lanceolate, 5-nerved, finely scabrous, 10 mm. long. Mountains: Colo. *Mont.*

15. *E. Macounii* Vasey. Stem 3-10 dm. high, smooth; leaf-blades erect, scabrous, 7-15 cm. long, 2-4 mm. wide; spike slender, 7-12 cm. long; spikelets often solitary at the nodes, 1-3-flowered; lemma scabrous above, 8-10 mm. long, 5-nerved. Meadows: Man.—N.M.—Utah—Alta. *Plain—Submont.*

16. *E. curvatus* Piper. Stem erect, 6-10 dm. high, glabrous; leaf-blades 1-2 dm. long, 5-7 mm. wide, usually flat, scabrous on both sides; spike stout, erect, short-exserted, 5-12 cm. long; lemma 3-5-nerved, sparingly scabrous-hispidulous towards the apex, 8-12 mm. long, acuminate to short-awned; awn

2 mm. long or less. *E. virginicus submuticus* Hook. River banks: Man.—Ills.—Kans.—Wash. *Plain—Submont.* Jl—Au.

17. *E. Howellii* Scribn. & Merrill. Somewhat tufted perennial; stem 6–8 dm. high, glabrous; leaf-blades spreading, flat, 10–15 cm. long, 4–8 mm. wide, minutely scabrous; spike exserted, 7–10 cm long; spikelets usually in pairs, 2–4-flowered; lemma 10–12 mm. long, acuminate, usually awn-pointed, sparingly scabrous toward the apex. *E. glaucus brevistaratus* Davy. Grassy ground: Alaska—Ore. Jl—Au.

18. *E. condensatus* Presl. Stems tufted, 1–2 m high, stout, striate, scabrous or scabro-puberulent above; leaf-blades 3–10 dm. long, 5–10 mm. wide, more or less scabrous; spike 2–4 dm. long; lemma 12–15 mm long, acuminate or awn-pointed. Hills and alkaline ground: Alta.—Neb.—N.M.—Calif.—B.C. *Plain—Mont.* Je—Au.

19. *E. triticoides* Buckley. Stem slender, 6–8 dm. high; leaf-blades 1.5–3 dm. long, about 7 mm. wide, flat or somewhat involute, scabrous on the margins and nerves; spike about 1.5 dm. long, erect; spikelets 12–18 mm. long, 4–6-flowered, lemma 8–10 mm long, 9-nerved, glabrous, awn-pointed. Meadows, hillsides, and bottom lands. Alta.—N.M.—Calif.—Wash. *Son.—Mont.* Je—Au.

20. *E. ambiguus* Vasey & Scribn. Tufted perennial; stem 6–10 dm high, glabrous; leaf-blades 1–4 dm. long, 2–4 mm. wide, rigid, flat or at last involute, scabrous, especially above; spikes 7–12 cm. long, erect; spikelets 5–9-flowered, 12–18 mm. long; empty glumes about 12 mm long, scabrous; lemma 10–12 mm. long, obscurely 5-nerved; awn 3 mm. or less long. Canons and hillsides: Colo.—Utah. *Submont.—Mont.* Je—Au.

21. *E. strigosus* Rydb. A caespitose perennial; stem 5–7 dm. high; leaf-blades 1–2 dm. long, about 3 mm. wide, flat or involute, scabrous; spike 1–1.5 dm. long; empty glumes linear-subulate, 7–9 mm long, very scabrous; lemma lanceolate, about 1 cm. long, awn-pointed or short-awned. Foot-hills and shale-slopes: Colo.—Wyo. *Submont.* Je—Jl.

22. *E. salinus* M. E. Jones. Tufted perennial; stem 3–6 dm high, smooth; leaf-sheaths enlarged, long-remaining and becoming fibrous; leaf-blades thick, involute, puberulent near the throat, the basal ones 1–1.5 dm long; stem-leaves 5–10 cm. long, spike 5–10 cm long, narrow; spikelets about 12 mm. long, 7–9-flowered, empty glumes 4 mm long, somewhat falcate; lemma about 8 mm long. Saline soil: Utah—Wyo. *Son.—Submont.* Jl.

23. *E. simplex* Scribn. & Williams. Stems tufted, 3–4 dm. high; leaf-blades 4–10 cm. long, 3–6 mm. wide, becoming involute, strigose-scabrous above, spikes 6–10 cm. long; rachis flattened and scabrous on the edges, spikelets singly or sometimes in pairs, about 1.5 cm long, 5–7-flowered; empty glumes very rigid, unequal, 8–10 mm. long; lemma about 7 mm. long, smooth, acuminate, awn 4–6 mm long. Alkaline soil: Wyo.—N.M.—Ore. *Submont.—Subalp.* Je—Jl.

24. *E. villiflorus* Rydb. Stem 4–6 dm. high, finely retrorse-pubescent, leaf-blades 1–2 dm. long, about 2 mm. wide, strongly involute, scabrous above, spike 1–1.5 dm. long, spikelets 1 or 2 at each node; lemma lanceolate, 5-nerved, villous-hirsute, about 1 cm. long. Plains and foot-hills: Colo.—Alta. *Plain—Submont.* Jl.

25. *E. arenicola* Scribn. & Smith. Stem 8–15 dm high, glabrous; leaf-blades 2–4 mm. wide, 2–3 dm. long, strongly involute; spike slender, 1.5–2.5 dm long; spikelets in pairs or singly, about 6-flowered; lemma acute, mucronate or awn-pointed, about 10 mm. long. *E. dasytachys litoralis* Am. auth., not Griseb. Sand dunes: Wash.—Ida.—Ore. *Son.* Je—N.

26. *E. cinereus* Scribn. & Merr. Stem densely short-pubescent, except where protected by the sheaths, about 1 m. high; leaf-blades 2–3 dm. long, 5 mm wide, often involute; spike about 15 cm. long; spikelets usually 2 at each node, 3–4-flowered; lemma 9–10 mm. long, strigose. Dry plains: Calif.—Nev.—Ida. *Son.* Je.

27. *E. flavescens* Scribn & Smith. Stem 6–10 dm high, glabrous, or pubescent just below the nodes, leaf-blades 2–4 dm. long, 4–8 mm. wide, smooth beneath, scabrous or strigulose above; spike 1–2 dm long, yellowish; spikelets 3–6-flowered, 1–2 cm. long; lemma 10–12 mm long, mucronate or awn-pointed. Sand: Wash.—Ida.—Ore. *Son.* J1–Au.

28. *E. innovatus* Beal. Stem smooth, or pubescent just below the nodes; leaf-blades rather rigid, 5–18 cm. long, 2–8 mm. wide, scabrous on the margins and nerves beneath, spike 4–10 cm long; spikelets 3–6-flowered, 10–15 mm. long; lemma densely pubescent, usually villous, 8–10 mm. long; awns 2–4 mm. long. *E. Brownii* Scribn. & Smith. Hills: Sask.—S.D.—Wyo.—B.C. *Submont.* Je–Au.

78. *HYSTRIX* Moench.

Perennials, with rootstocks and terminal spikes. Spikelets in pairs or 3's, spreading, 2-several-flowered; rachilla articulate below the lemmas. Empty glumes in the lowest spikelets subulate, minute, elsewhere wanting. Lemma lanceolate, rigid, convolute, rounded on the back, awned. Styles very short; stigmas plumose. Grain oblong, adherent to the palea.

1. *H. Hystrix* (L.) Millsp. Stem 6–12 dm. tall; leaf-blades 1–2 5 dm. long, 6–12 mm. wide, smooth beneath, scabrous above; spike 7–18 cm. long; spikelets at length spreading. 8–12 mm. long, exclusive of the awns; lemma 8–12 mm. long, acuminate; awn about 2 5 cm. long. *Asprella Hystrix* Willd. Rocky woods: N B—Ga.—Neb.—Sask. *Plain.* Je–J1.

Family 13. *CYPERACEAE*. SEDGE FAMILY.

Grass-like or rush-like plants, with mostly solid stems. Leaves 3-ranked, with closed sheaths and narrow blades. Flowers perfect or unisexual, in spikelets; bractlets (glumes or scales) 2-ranked or spirally arranged. Perianth composed of bristles, a sack-like organ (perigynium), or wanting. Stamens usually 3, rarely 1 or 2, or more than 3; filaments slender; anthers 2-celled. Gynoecium of 2 or 3 united carpels, but ovary 1-celled and 1-ovuled; stigmas 2 or 3. Ovules anatropous, erect. Fruit an achene; endosperm mealy.

Flowers all perfect, or at least one in each spikelet perfect.

Glumes of the spikelets 2-ranked.

Perianth represented by bristles, inflorescence axillary **1 DULICHIMUM.**

Perianth wanting, spikelets in terminal, solitary or umbellate heads **2 CYPERUS.**

Glumes of the spikelets spirally imbricate

Base of the style persistent as a tubercle on the achene

Basal empty glumes several

3 RYNCHOSPORA.

Basal empty glumes wanting, or 1 or 2

Spikelets solitary, stem leafless, bristles usually present

4 ELEOCHARIS.

Spikelets several or numerous, stem leafy, bristles none

5. STENOPHYLLUS.

Base of the style not persistent as a tubercle.

Base of the style swollen, bristles none.

6 FIMBRISTYLIS.

Base of the style not swollen; bristles usually present

Flowers without any inner scales.

Bristles much elongating in fruit, silky

Bristles 6, but each 4–6-cleft to near the base, therefore appearing numerous **7. ERIOPHORUM.**

Bristles 6, simple, crisp

8 LEUCOCOMA.

Bristles short, or little elongating, rarely wanting

9. SCIRPUS

Flowers with a small inner scale between the flower and the rachis

10. HEMICARPHA.

Flowers monoecious or dioecious

Achenes not enclosed in a perigynium.

Spikes several, clustered, glumes subtending a single flower.

11 KOBRESIA.

Spikes solitary, glumes subtending 2 flowers.

12. ELYNA.

Achenes enclosed in a perigynium.

13 CAREX.

1. *DULICHIMUM* L C Rich.

Tall perennials, with rootstocks and hollow jointed stems, leafy to the top. Leaves 3-ranked. Spikelets in axillary, simple or compound spikes, flat, linear, many-flowered; glumes 2-ranked, carinate, conduplicate, decurrent on the

internode below. Flowers perfect. Perianth of 6-9 retrorsely barbed bristles. Stamens 3. Style persistent as a beak on the top of the achene. Stigmas 2. Achenes linear-oblong.

1. *D. arundinaceum* (L.) Britton. Stem stout, 3-10 dm. high, leaves numerous, flat, 2-8 cm. long, 4-8 mm. wide, spreading; lower sheaths bladeless; spikelets 12-25 mm. long, about 2 mm. wide, 6-12-flowered; glumes lanceolate, acuminate, strongly nerved, brownish; bristles longer than the achenes. *D. spathaceum* Pers. Wet places: Newf.—Fla.—Tex.—Ore.—B C; C. Am. *Plain*. JI-O.

2. *CYPÉRUS* L. GALINGALE, NUT GRASS

Sub-scapose perennials or annuals. Leaves basal; blades narrow, grass-like. Scapes in our species simple, triangular, with one or more bracts at the summit, subtending a simple or compound, umbellate or capitate inflorescence; rays usually very unequal in length. Spikelets flat to nearly terete. Glumes 2-ranked, concave, conduplicate or keeled. Flowers perfect; perianth none. Stamens 1-3. Styles deciduous from the summit of the achenes; stigmas 2 or 3. Achenes without a tubercle.

Glumes falling away from the persistent rachis of the flat spikelets

Style 2-cleft; achenes lenticular.

Style 3-cleft; achenes 3-angled

Wings of the rachis none or very narrow

Annuals, stamen 1.

Glumes awned or mucronate.

Glumes acute, neither awned nor mucronate

Perennials, stamens 2 or 3.

Glumes tipped with a curved or bent awn; perennials with a rootstock

Glumes blunt or mucronate, perennials with a corm-like base

Heads oblong; spikelets ascending; stem rough

Heads short, spikelets more or less spreading, stem smooth

Glumes broadly ovate, achenes 1.5-2 mm. long

Glumes oblong-ovate; achenes 2-2.5 mm. long.

Wings of the rachis prominent and separating from it as inferior scales

8 *C. erythrorhizos*.

Spikelets wholly falling away, usually leaving the two lower glumes persistent

9 *C. strigosus*

1. *C. diandrus* Torr. Annual; stems tufted, 5-30 cm. high; leaves about 2 mm. wide; bracts usually 3, at least one much exceeding the spikelets; spikelets in terminal capitate clusters, linear-oblong, 8-18 mm. long, flat, many-flowered; glumes ovate, green, brown, or with brown margins, obtuse, 1-nerved; stamens 2 or 3; achenes oblong, gray. Marshy places: N.B.—S C.—Colo.—S.D. *Plain*—*Submont.* Au-O.

2. *C. inflexus* Muhl. Stems slender, tufted, 2-15 cm. high; leaves 1-2 mm. wide; bracts 2 or 3, longer than the umbel; spikelets capitate or in 3-rayed, sessile umbels, linear-oblong, 6-10-flowered, 4-6 mm. long; glumes light brown, lanceolate, several-nerved. *C. aristatus* Rottb. Wet sandy soil: N.B.—Fla.—Calif.—B.C.; Mex. *Plain*—*Submont.* JI-S.

3. *C. acuminatus* Torr. Stems slender, tufted, 5-35 cm. high; leaves usually less than 2 mm. wide, light green; bracts much elongated; spikelets capitate, in 2-4-rayed umbels, flat, ovate-oblong, 4-8 mm. long; glumes oblong, pale green, 3-nerved, with short, more or less recurved tips. Wet soil: Ill.—La.—Calif.—Wash. *Plain*. JI-O.

4. *C. Fendlerianus* Boeckl. Stem slender, 3-5 dm. high, triangular above, scabrous on the angles; leaves flat, 2-6 mm. wide, scabrous on the margins; bracts 3-6, the longer much exceeding the inflorescence; spikelets spicate, in simple, often subcapitate, few-rayed umbels, oblong to cylindric, 5-15 mm. long, 2-3 mm. thick; glumes orbicular-ovate, striate, pale greenish brown with brown or yellow margins. Wet places: w Tex.—Colo.—Ariz; n Mex. *Plain*—*Submont.* JI-S.

5. *C. Schweinitzii* Torr. Stems tufted, rough, 3-7 dm. high; leaves 2-5 mm. wide, rough-margined; bracts 3-7, erect; spikelets spicate, in 3-9-rayed umbels, flat, linear-oblong, 6-12-flowered, 8-16 mm. long; glumes convex, light

green, ovate, acute or acuminate, 9-13-nerved. Sandy soil: Ont.—Mo.—Kans.—(? N.M.)—S.D.—Sask. *Plain.* Au—O.

6. **C. Houghtoni** Torr. Stem smooth, 3-6 dm. high; leaves 1-2 mm. wide; bracts 3-5, some much exceeding the inflorescence; spikelets loosely capitate in 1-5-rayed umbels, compressed, acute, 8-15 mm. long, about 2 mm. wide, 11-15-flowered; glumes chestnut brown, shining, oblong, obtuse, strongly 11-nerved. Sandy places: Mass.—Va.—Ark.—w S.D.—Man. *Plain.* Jl—Au.

7. **C. Bushii** Britton. Stem smooth, 3-6 dm. high, longer than the leaves; leaves 3-4 mm. wide, smooth; spikelets capitate in 1-5-rayed umbels, flat, linear, acute, 8-15 mm. long; glumes oblong, mucronate, shining, 11-nerved. *C. filiculis* Coult., not Vahl. Sandy soil: Minn.—Mo.—Tex.—Colo.—Ore.—Wash. *Plain.* Jl—S.

8. **C. erythrorhizos** Muhl. Annual; stems tufted, 0.7-6 dm. high; leaves 3-8 mm. wide, rough-margined, the lower equalling or exceeding the stem; bracts 3-7, some 3-5 times as long as the inflorescence; spikelets spicate in mostly compound umbels, linear, subacute, 6-30 mm. long, less than 2 mm. wide, compressed, many-flowered; glumes bright chestnut-brown, oblong-lanceolate, mucronate, appressed. Wet places: Mass.—Fla.—Tex.—Calif.—Wash. *Plain.* Au—O.

9. **C. strigosus** L. Perennial, with a corm-like base, 3-10 dm. high; leaves rough-margined, 4-6 mm. wide; some of the bracts exceeding the inflorescence; spikelets spicate or subcapitate in more or less compound umbels, flat, linear, 6-25 mm. long, 2 mm. wide or less, 7-25-flowered; glumes straw-colored, oblong-lanceolate, several-nerved, appressed; achenes linear-oblong, acute. Moist meadows: Me.—Fla.—Tex.—Calif.—Wash.—w S. D. *Plain.* Au—O.

3. RYNCHOSPORA Vahl. BEAKED RUSH.

Caulescent perennials, with rootstocks. Spikelets oblong or fusiform; glumes spirally imbricate, the lower empty, usually mucronate or cuspidate by the excurrent midrib. Perianth of 1-24, mostly 6, barbed or scabrous bristles, or rarely wanting. Stamens usually 3. Stigmas 2, rarely wholly united. Achenes lenticular, smooth, cancellate or transversely wrinkled. Base of the style persistent, forming a tubercle, or the whole style persistent.

1. **R. alba** (L.) Vahl. Stems slender, glabrous, 1.5-2.5 dm. high; leaves bristle-like, 0.5-1 mm. wide; spikelets several, in 1-4 dense corymbose heads, narrowly oblong, 4-6 mm. long; glumes ovate or ovate-lanceolate, white, acute; bristles 9-15, equalling the achenes, which are obovate-oblong, lenticular, pale brown; tubercle triangular, flat. Bogs: Newf.—Fla.—Ky.—Ida.—Calif.—Alaska; Eurasia. *Boreal*—*Mont.* Je—Au.

4. ELEOCHARIS R. Br. SPIKE-RUSH, WIRE-GRASS.

Annual or perennial scapose herbs. Leaves reduced to mere sheaths, or the lower rarely blade-bearing. Scape angled or terete. Spikelets solitary, terminal, erect. Glumes spirally arranged, imbricate. Perianth of 1-12 bristles, usually retrorsely barbed. Stamens 2-3. Stigmas 2 or 3. Achene lenticular or triangular, sometimes obscurely so. Base of the styles persistent on the summit of the achenes, forming a tubercle.

Style-branches 2, achenes lenticular or biconvex.

Sheath hyaline, and scarious at the summit.

Sheath firm, not scarious at the summit

Annuals, with fibrous roots.

Achenes black, shining.

Achenes pale brown, dull.

Spikelets narrowly oblong or subcylindric; glumes blunt, closely appressed.

Spikelets lance-ovoid or lance-oblong; glumes acutish, more spreading.

Perennials, with rootstocks.

Style-branches 3; achenes trigonous or turgid; perennials, with rootstocks.

Achenes cancellate and longitudinally ribbed; spikelets flat

Achenes smooth, papillose or reticulate.

1. *E. thermalis.*

2. *E. atropurpurea.*

3. *E. Engelmanni.*

4. *E. monticola.*

5. *E. palustris.*

6. *E. acicularis.*

Tubercle of the achenes short-conic to depressed, plainly distinguishable from the achene.

Achenes papillose.

Stem filiform; glumes obtuse.

Stem flat; glumes acute.

Achenes finely reticulated

Tubercle of the achenes long-conic, scarcely distinguishable from the body of the achene

7 *E. tenuis*.

8 *E. acuminata*.

9 *E. arenicola*.

10 *E. rostellata*.

1. *E. thermalis* Rydb. Perennial, with a creeping rootstock; stems tufted, yellowish green, 3-10 cm. high, somewhat flattened, striate; spikelet obovate, obtuse, 4 mm. long, 3 mm. thick, glumes very thin, ovate, acutish, achenes lenticular, broadly obovate, dark brown, smooth and shining, 1 mm. long; tubercle conic. Hot springs and thermal waters: Mont—Wyo. *Mont.* JI—Au

2. *E. atropurpurea* (Retz.) Kunth. Stems tufted, slender, 3-10 cm. high; spikelet ovoid, subacute, 3-4 mm. long, 2 mm. thick; glumes ovate-oblong, obtuse, or the upper acute, purple-brown, with green midrib and narrow scarious margins; bristles 2-4, fragile, white, about as long as the achenes; achenes 0.5 mm. long, smooth, lenticular; tubercles depressed-conic, constricted at the base. Moist soil: Ia.—Fla.—Tex—(?) Colo.; trop. Am.; Eurasia. *Austral.* JI—S.

3. *E. Engelmanni* Steud. Stems 2-4.5 dm. high, tufted; spikelet obtuse, 5-15 mm. long, 2-3 mm. thick; glumes pale brown, with green midrib and narrow scarious margin, ovate, obtuse; bristles about 6, not longer than the achenes, or none; achenes broadly obovate, smooth; tubercle broad, low, covering the top of the achene. Wet places: Mass—N.J.—Tex—Calif—Wash. *Plain—Submont.* JI—S.

4. *E. monticola* Fernald. Stems 1-2.5 dm. high, tufted, spikelets 6-9 mm. long, 2-3.5 mm. thick, acutish; glumes chestnut-brown or purplish, with paler midribs and margins, acutish; bristles 6, equalling or slightly exceeding the achenes, or (in var *leviseta*) represented only by the unbarbed basal portion; achenes as in the preceding. Wet places: Calif—Wash.; the var *leviseta*: Wash.—Ida—Man. *Submont.*

5. *E. palustris* (L.) R. & S. Stems striate, 3-15 dm. high; spikelets oblong to ovoid-cylindric, 6-25 mm. long, 3-4 mm. thick, glumes ovate-lanceolate or ovate-oblong, purplish brown with scarious margins and green midrib, or wholly green; bristles usually 4, longer than the achenes; achenes yellow, more than 1 mm. long; tubercle conic, constricted at the base. *E. glaucescens* Willd., a slender form with narrower tubercle. In ponds and marshes: Lab.—Fla.—Tex.—Calif.—B.C.; Eurasia. *Plain—Mont.* Au—S.

6. *E. acicularis* (L.) R. & S. Stems tufted, filiform, obscurely 4-angled, grooved, 5-20 cm. high; spikelets narrowly ovate, acute, 3-10-flowered, 3-6 mm. long; glumes oblong, obtuse, or the upper acute, pale green, often with two brown bands; bristles 3-4, fragile, fugaceous, shorter than the achenes; achenes obovoid, pale, obscurely 3-angled; tubercle conic. Wet places: Newf.—N.J.—N.M.—Calif.—B.C.; Mex; Eurasia. *Plain—Mont.* JI—S.

7. *E. tenuis* (Willd.) Schultes. Stems tufted, filiform, 4-angled, 2-4 dm. high, spikelets narrowly oblong, acute, 6-10 mm. long, about 2 mm. thick, glumes thin, obovate or obovate-oblong, obtuse, with greenish midvein and scarious margins; bristles 2-4, shorter than the achenes, fugaceous or wanting; achenes obovoid, obtusely 3-angled, yellowish brown; tubercle conic, short. Wet places: N.S.—Fla.—Tex.—Colo.—Sask. *Plain—Submont.* My—JI

8. *E. acuminata* (Muhl.) Nces. Stems tufted, flattened, striate, 2-6 dm. high; spikelets ovoid or oblong, obtuse, 6-12 mm. long; glumes oblong or ovate-lanceolate, acute or obtusish, purple-brown with green midrib and hyaline margins; bristles 1-5, mostly shorter than the achenes; achenes obovoid, very obtusely 3-angled, light yellowish brown; tubercle depressed-conic. Wet places: Que.—Ga.—La.—Colo.—B.C. Je—Au.

9. *E. arenicola* Torr. Stems tufted, slender, 1.5-4.5 dm. high, grooved; spikelets oblong to ovoid-oblong, 4-12 mm. long, 2.5-3.5 mm. thick; glumes oblong or ovate, thin, blunt, with a brown apex and whitish margins; bristles 6, persistent, the longer ones as long as the achenes; achenes 3-angled, oblong-

obovoid, faintly reticulate; tubercle thick, deltoid. Perhaps not distinct from *E. montana* H.B.K. Sandy shores: S.C.—Fla.—Tex.—Calif.—Colo. *Son.*—*Submont.*

10. *E. rostellata* Torr. Stems slender, flattened, the sterile ones often reclining and rooting at the summit, grooved; spikelets oblong, 6–12 mm. long, 2 mm thick; glumes ovate, obtuse, or the upper acute, green with a darker midvein; bristles 4–8, longer than the achenes; achenes obovoid, finely reticulate. Marshes and wet meadows: N.H.—Fla.—Tex.—Calif.—B.C.; Mex. *Plain*—*Submont.* Au-S.

5. *STENOPHYLLUS* Raf.

Scapose annuals, with narrowly linear or filiform leaves. Spikelets umbellate, or capitate, rarely solitary; glumes spirally arranged, imbricate, deciduous. Flowers perfect; perianth wanting. Stamens 2 or 3. Base of the style swollen, persistent, forming a tubercle; stigmas 2 or 3. Achenes 3-angled or lenticular.

1. *S. capillaris* (L.) Britton Annual, stems tufted, filiform, smooth, 5–25 cm high; leaves filiform, roughish, bracts 1–3, setaceous; spikelets narrowly oblong, 5–8 mm long, less than 2 mm thick, in terminal, simple or compound umbels, glumes oblong, obtuse or emarginate, dark-brown with green keel; achenes yellowish, transversely wrinkled. River valleys: Me.—Fla.—Calif.—Ore. (but no specimens seen from the Rockies). Jl-S.

6. *FIMBRISTYLIS* Vahl

Annual or perennial sub-scapose herbs, with grass-like leaves. Spikelets capitate or in ours umbellate, terete, several- or many-flowered; glumes spirally arranged, imbricate. Flowers perfect; perianth none. Stamens 1–3. Style usually enlarged at the base, but wholly deciduous at maturity; stigmas 2–3. Achenes lenticular or 3-angled

1. *F. interior* Britton Perennial, with short stolons; stem thickened at the base, striate, smooth, 3–6 dm. high; leaves rough-margined, involute; spikelets in somewhat compound umbels, ovoid or ovoid-oblong, acutish, 1 cm. long or less; glumes yellowish-brown, ovate, striate, mucronate, dull; achenes broadly obovate, blunt, cancellate, chestnut brown. *F. castanea* and *F. thermalis* of Fl. Colo. Meadows: Colo.—Neb.—Tex. *Plain.* Jl-Au.

7. *ERIOPHORUM* L. COTTON-GRASS.

Perennial bog plants, with rootstocks. Stems triangular or terete. Leaves with linear blades or some of them reduced to bladeless sheaths. Spikelets terminal, solitary, or a few in heads or umbels. Glumes spirally arranged, all usually subtending perfect flowers. Perianth of 6 members, but each 4–6-cleft to the base into long soft, usually white bristles, exserted much beyond the glumes at maturity. Stamens 1–3. Styles deciduous; stigmas 3. Achenes 3-angled, oblong, ellipsoid or obovoid.

Spikelets solitary, involucre wanting

Plant stoloniferous

Glumes purplish-brown with narrow, pale margins

Glumes purplish-brown with white, broad margins

Plant tufted, not stoloniferous

Upper sheaths inflated, stem rough above.

Upper sheaths not inflated, stem smooth

Spikelets several, subtended by foliaceous bracts

Leaf-blades triangular-channeled throughout

Leaf-blades flat, at least below the middle

Midrib of the glumes not prominent at the tip of the glume.

Midrib of the glumes prominent to the very tip.

1 *E. Scheuchzeri*.

2 *E. Chamissonis*.

3 *E. callitrix*.

4. *E. opacum*.

5. *E. gracile*.

6. *E. angustifolium*.

7. *E. viridicarinatum*.

1. *E. Scheuchzeri* Hoppe. Stem slender, 2.5–4 dm. high; sheaths all blade-bearing or the uppermost one bladeless; blades filiform, channeled. *E. capitatum* Host. Bogs: Lab.—Newf.—Wyo.—B.C.—Alaska. *Mont.*—*Alp.* Jl-O.

2. *E. Chamissonis* C. A. Mey. Stems 1-7 dm. high, somewhat triangular; upper sheaths inflated, bladeless; leaf-blades filiform, triangular-channelled, 3-10 cm. long; bristles often reddish-brown. *E. russeolatum* Fries. Bogs: N.B.—Ont.—Wyo.—Ore.—B.C.; Eurasia. *Mont.—Subalp.* Je—Au.

3. *E. callitrix* Cham. Stems obtusely 3-angled, 2-5 dm. high; leaf-blades filiform, triangular-channelled; glumes thin, ovate-lanceolate or the lowest lanceolate, acuminate, pale brown. *E. vaginatum* Torr., not L. Bogs: Newf.—Maas.—Pa.—Sask.—B.C.—Alaska. *Boreal—Mont.* Je—Au.

4. *E. opacum* (Björnstr.) Fernald. Stem terete or nearly so, 3-6 dm. high; basal leaves elongate, filiform, channelled; stem-leaves reduced to 2 or 3 close sheaths; glumes thin, ovate-lanceolate or the inner ones linear-lanceolate, acuminate. Bogs: Me.—Mass.—B.C.—Yukon; Eurasia. *Boreal—Mont.* My—Jl.

5. *E. gracile* Koch. Stem slender, smooth, terete, 3-6 dm. high; blades of the stem-leaves 2-3 cm. long, the basal ones longer; bracts about 1 cm. long; spikelets 2-6, on pubescent peduncles; glumes ovate, gray or nearly black, acutish, with prominent midrib. Bogs: Que.—N.Y.—Colo.—Calif.—B.C., Eurasia. *Plain—Mont.* Je—Au.

6. *E. angustifolium* Roth. Stem smooth, obtusely triangular above, 3-6 dm. high; blades rough-margined, 3-8 mm. wide; bracts 2-4, often black at the base; spikelets 2-12, ovoid or oblong; peduncles smooth; glumes ovate-lanceolate, acute or acuminate, purple-green or brown. *E. polystachyon* L., in part. *E. ocreatum* A. Nels. Bogs: Newf.—Me.—Ill.—N.M.—Ore.—Alaska; Eurasia. *Submont.—Subalp.* Je—Au.

7. *E. viridicarinatum* (Engelm.) Fernald. Stem 3-6 dm. high; leaf-blades 2-6 mm. wide, the upper 15 cm. long or less; bracts not black at the base; spikelets 5-30; peduncles fine-hairy; glumes ovate-lanceolate; achenes oblong-obovoid. *E. polystachyon* Am. auth., mainly. Bogs and wet meadows: Newf.—Ga.—Ohio—Wyo.—B.C. *Submont.* Jl—Au.

8. LEUCOCOMA Ehrh. ALPINE COTTON-GRASS.

Perennial bog plants, with rootstocks. Stems triangular. Spikelets solitary, usually subtended by a subulate bract and attached slightly obliquely. Glumes spirally arranged, all usually subtending perfect flowers. Perianth of 6 white soft bristles, at maturity exerted far beyond the glumes. Stamens 3. Styles deciduous. Achenes obovoid, somewhat 3-angled, without tubercle. [*Trichophorum* Pers., in part.]

1. *L. alpina* (L.) Rydb. Stems numerous, not tufted, 1.5-2.5 dm. high; leaves subulate, 6-20 mm. long, triangular, channelled; lower sheaths often bladeless; glumes oblong-lanceolate, yellowish brown with slender midvein. *Eriophorum alpinum* L. Cold bogs. Newf.—Conn.—Mich.—B.C.; Eurasia. *Mont.—Alp.* Je—Au.

9. SCIRPUS L. BULRUSH, CLUB-RUSH, TULE.

Annual or perennial, caulescent or scapose herbs. Leaves grass-like, or in many species reduced to basal sheaths. Spikelets terete or somewhat flattened, solitary, capitate or umbellate. Glumes spirally arranged, some of the lower often empty. Flowers perfect. Perianth of 1-6 barbed, pubescent or smooth bristles, rarely wanting. Stamens 2-3. Style wholly deciduous, not swollen at the base, or rarely its base persistent as a small tip. Stigmas 2-3. Achenes triangular or lenticular, rarely plano-convex.

Involucre of a single bract or wanting.

Spikelets solitary, rarely two together; plants tufted (except No. 5)

Annuals; stamens 2; bristles none.

Perennials, with rootstocks.

Involucre none.

Involucre present, consisting of one erect bract

Bract scarcely exceeding the spikelet, often shorter; bog plants

Bristles 6, longer than the achenes

Bristles none.

Bract at least twice as long as the spikelet, aquatic plants.

1. *S. coloradensis*.

2. *S. pauciflorus*.

3. *S. caespitosus*

4. *S. pumilus*.

5. *S. subterminalis*.

- Spikelets normally more than one, usually several, sometimes numerous
 Spikelets few, 1-12, appearing lateral, in a single capitate cluster.
 Annuals, with fibrous roots, tufted; achenes dark, transversely wrinkled.
 Spikelets obtuse; achenes plano-convex. 6. *S. Hallii*.
 Spikelets acute; achenes 3-angular 7. *S. saximontanus*.
 Perennials, with rootstocks, achenes plano-convex, obovate.
 Stem sharply 3-angled.
 Spikelets acute; bracts long; glumes awned. 8. *S. americanus*.
 Spikelets obtuse, bracts short, glumes mucronate. 9. *S. Olneyi*
 Stem terete, striate. 10. *S. nevadensis*.
 Spikelets numerous in small clusters of 1-7, arranged in compound umbels; perennials with stout rootstocks.
 Style 2-cleft, achenes obovate and plano-convex, brown.
 Achenes 2 mm long, nearly as long as the glumes; spikelets ovoid.
 Achenes 3 mm. long, distinctly shorter than the glumes; spikelet oblong-cylindric 11. *S. validus*
 Style 3-claft; achenes obcordate, 3-angled, yellowish 12. *S. occidentalis*
 Involute of two or more leaves with flat blades; perennials, with rootstocks 13. *S. heterochaetus*
 Spikelets 3-10, capitate, relatively large 14. *S. paludosus*
 Spikelets numerous, in compound umbels or in umbellate heads, relatively small
 Bristles downwardly barbed, not much exceeding the fruit.
 Style-branches 2, achenes plano-convex, bristles mostly 4.
 Style-branches 3; achenes oblong, 3-angular; bristles 6 15. *S. microcarpus*
 Plant dark green, glumes acute, achenes pale brown 16. *S. atrovirens*.
 Plant pale; glumes rough-awned, achenes straw-colored.
 Bristles 6, smooth, much exceeding the glumes at maturity; achenes 3-angled, whitish. 17. *S. pallidus*.
 Spikelets all sessile; glumes brown. 18. *S. cyperinus*
 Spikelets mostly pedicelated; glumes mostly greenish black. 19. *S. atrocinctus*.

1. *S. coloradensis* Britt. Annual; stems filiform, 2-5 cm. high; spikelet bractless, linear-oblong, acutish, 3-5 mm. long, 2 mm. thick; glumes lanceolate, acutish, keel green, bordered with two brown bands and scarious margins; achenes brown, obovate, 1 mm. long, 3-gonous, finely papillose. Shores: Colo.; Nev. Plain.

2. *S. pauciflorus* Lightf. Rootstock filiform; stems 3-angled, filiform, leafless, 7-25 cm. high; spikelet oblong, compressed, 4-10-flowered, 4-6 mm. long, glumes brown with lighter margins and midrib, lanceolate, acuminate; bristles 2-6, usually longer than the achenes; achenes obovoid, abruptly beaked, finely reticulate. Wet soil: Que.—Me.—N.Y.—N.M.—Calif.—B.C.; Eurasia. Mont.—Subalp. JI-O.

3. *S. caespitosus* L. Stems light green, filiform, 1-4 dm. high; basal sheaths numerous, the upper one bearing a short blade; spikelet ovoid-oblong, 4 mm. long; glumes yellowish brown, ovate, obtuse; achenes oblong, 3-angled, brown, acute. Bogs and wet places: Greenl.—Ill.—Colo.—Wash.—Alaska; Eurasia. Mont.—Alp. Je-Au.

4. *S. pumilus* Vahl. Stems terete, 1 dm. high or less, sheathed at the base; upper sheath with a short blade; spikelet rounded-ovoid; glumes ovate, acute or pointed, brown with green midrib and margins; achene 3-angular, smooth. *S. alpinus* Schleicher. Alpine wet places: Canadian Rockies; Alps. JI-Au.

5. *S. subterminalis* Torr. Stem slender, terete, nodulose, 3-10 dm. high; leaves very slender, 1.5-6 dm. long, 0.5-1.5 mm. wide; spikelet oblong-cylindric, 6-15 mm. long; bract subulate, erect, 1-2.5 cm. long; glumes ovate-lanceolate, acute, light brown with green midrib; bristles 6, rarely equalling the achenes; these obovoid, 3-angled, dark brown, smooth. Ponds and streams: Newf.—S.C.—Mich.—Ida.—Wash.—B.C. Submont. JI-Au.

6. *S. Hallii* A. Gray. Stems slender, smooth, obtusely 3-angular, 1-3 dm. high; upper sheath bearing a filiform blade 1-6 cm. long; spikelets 1-7, capitate, oblong-cylindric, obtuse, 6-12 mm. long; bract 2-10 cm. long; glumes ovate-lanceolate, greenish brown, acuminate; bristles none. Wet places: Mass.—Fla.—Tex.—Colo.—Utah.—Mex. Plain—Submont. JI-S.

7. *S. saximontanus* Fernald. Stems slender, smooth, 1-3 dm. high, tufted, short-leaved at the base; bract erect, one-half to one-fourth as long as the stem;

spikelets 1-4, capitate, oblong-cylindric, acute, 5-12 mm. long; glumes ovate, cuspidate-acuminate, with pale brown margins; style 3-cleft. Wet places: Tex.—Wyo—Utah—Mex. *Plain—Submont.*

8. *S. americanus* Pers. Stems erect, 3-12 dm. high; leaves 1-3, narrowly linear, keeled; spikelets 1-7, oblong, acute, 8-25 mm. long; bract 2-10 cm. long, glumes broadly ovate, brown, often emarginate or 2-cleft, awned, achenes smooth, dark brown. *S. pungens* Vahl. Fresh or saline swamps: Newf.—Fla.—Tex.—Calif.—B C. *Plain—Submont* Je-S

9. *S. Olneyi* A. Gray. Stems stout, 6-20 dm. high; leaves 1-3, narrow, 2-12 cm. long; spikelets 5-12, oblong, obtuse, 5-8 mm. long; bract short, stout, 1-4 cm. long; glumes oval or orbicular, dark brown, with green midrib, emarginate or mucronate, brown. Salt marshes: N H.—Fla.—Tex.—Calif.—Ore., W. Ind.; Mex.; C. Am. *Plain—Son.* Je-S.

10. *S. nevadensis* S. Wats. Stems 2-4 dm. high; leaves several, mostly basal, convolute; spikelets 1-5, ovoid or ovoid-oblong, 6-18 mm. long; bract flattened above, rough-margined; glumes broadly ovate, obtuse or acute, chestnut-brown, smooth and shining, achenes minutely reticulate. Wet places, especially in alkaline soil: Sask.—Wyo.—Calif.—Wash. *Son.* Je-Jl.

11. *S. validus* Vahl. Stems stout, terete, smooth, spongy, 1-3 m. high, sometimes 2 cm. thick, sheathed below; spikelets 5-12 mm. long, 3-4 mm. thick, glumes ovate or suborbicular, slightly pubescent, with strong midrib, achenes plano-convex. *S. lacustris* Am. auth, not L. COMMON BULRUSH. In water Newf.—Fla.—Calif.—B.C.; W Ind; Mex *Plain—Mont.* Je-S

12. *S. occidentalis* (S. Wats.) Chase. Similar to *S. validus*, basal sheaths fibrillose on the margins, spikelets 20 mm. long, 4 mm. thick, glumes ovate, short-awned, viscid above; achenes biconvex. *S. lacustris occidentalis* S. Wats. TULE. In water. Newf.—N Y.—Mo.—N M.—Calif.—B C. *Plain—Submont* Jl-S.

13. *S. heterochaetus* Chase. Similar to *S. validus*, stem slender, 1-2 m. high, sheathed below; bracts glabrous; spikelets usually solitary on the slender branches, ovoid or ellipsoid, acutish, 8-15 mm. long, about 5 mm. thick; glumes ovate, glabrous, often erose-margined. In water. Vt —Mass —Neb.—Ida.—Ore. Jl-S.

14. *S. paludosus* A. Nels. Stems slender, smooth, sharply triangular, 3-6 dm. high; leaves pale green, smooth, 2-4 mm. wide; bracts 2 or 3; spikelets oblong-cylindric, mostly acute, 15-25 mm. long; glumes ovate, puberulent or glabrous, pale brown, 2-toothed at the apex, awned; achenes lenticular, obovate, yellowish brown. *S. campestris* Britt, not Roth. *S. interior* Britt *S. Brutomanus* Piper. Salt marshes: Que.—N.J.—Kans.—Tex.—Calif.—Wash. *Plain—Submont.* My—Au.

15. *S. microcarpus* Presl. Stem 1-1.5 m. high; sheaths often tinged with red; leaves rough-margined, often 1 m. long or more; spikelets ovoid-oblong, acute, 3-4 mm. long; glumes brown with green midvein; stamens 2; achenes oblong-obovate, nearly white. *S. rubrolinctus* Fern. Swamps: Newf.—Conn —N.M.—Calif —Alaska. *Plain—Submont.* Jl-S.

16. *S. atrovirens* Muhl. Stem triangular, leafy, 6-14 dm. high; leaf-blades elongate, more or less nodulose, rough on the margins, dark green, 6-12 mm. wide; spikelets ovoid-oblong, acute, 4-10 mm. long; glumes greenish brown, ovate-oblong, acute; bristles rarely wanting. Swamps: N.S.—Ga.—N.M.—La.—Sask. *Plain—Submont.* Je—Au.

17. *S. pallidus* (Britton) Fernald. Stem triangular, 1-1.5 m. high; leaf-blades elongate, pale, 6-15 mm. wide, somewhat nodulose; spikelets oblong to oblong-cylindric; glumes pale, ovate, acute, tipped with an awn half as long as the body. Wet ground: Man.—Kans —Tex.—N.M.—Wyo. *Plain—Submont* Je—Au.

18. *S. cyperinus* (L.) Kunth. Stem smooth, obtusely 3-angled or nearly terete, 6-18 dm. high; leaf-blades elongate, 4-6 mm. wide, rough-margined; bracts 3-6, their bases often brown or black; umbels irregularly compound;

spikelets ovoid-oblong, obtuse, 3-10 mm. long; glumes ovate or lanceolate, acute or subacute. Swamps: Newf.—Fla.—La.—Sask. *Plan.* Au-S.

19. *S. atrocinctus* Fernald. Stem 5-12 dm. high, smooth, terete; leaves bright green, 2-5 mm wide; bracts blackish at the base; spikelets 2.5-6 mm. long; glumes lance-ovate, acute; achenes 3-angled, white, ovate. Swamps: Newf.—N.J.—la.—B C *Submont.*—*Mont.* Je-Au.

10. HEMICARPHA Nees & Arn.

Dwarf annual tufted herbs. Leaves narrow, often setaceous. Spikelets terete, solitary or in small clusters. Glumes spirally arranged. Flowers perfect, each with a small translucent scale between it and the axis. Perianth wanting, *i. e.*, bristles none. Stamen 1. Style 2-cleft, not swollen at the base.

1. *H. aristulata* (Coville) Smyth. Stem longer than the setaceous glabrous leaves, 5-20 cm high; bracts 1-3, sometimes 2 cm. long; spikelets 4-8 mm long; glumes rhombic-obovate, brown, abruptly contracted into a subulate awn about as long as the body; achenes narrowly obovate, black. *H. intermedia* Piper. Sandy banks: Kans.—Tex.—Calif.—Wash. *Son*—*Submont.* Jl-S.

11. KOBRËSIA Willd.

Sedge-like perennials, with monoecious flowers. Spikelets several-flowered, forming a terminal spike. Glumes spirally arranged, the lower usually enclosing a pistillate, the upper a staminate flower. Stamens 3. Perianth lacking. Style short; stigmas 3. Achenes obtusely 3-angled.

1. *K. bipartita* (All.) Della Torre. Stems solitary or tufted, 1-3 dm high, smooth; leaves about 1 mm wide, involute; spikelets several in a spike, ascending, linear; glumes somewhat serrulate on the keel, fully 1 mm. long. *K. caricina* Willd. Arctic-alpine situations: Greenl.—Alta.—B C. *Alp.* Je-S.

12. ELYNA Schrad.

Low, tufted, sedge-like monoecious plants. Leaves mostly basal, narrow. Spikelets 2-flowered, forming a terminal spike. Glumes of the spikelets 3 or 4, usually only one flower-bearing. Flowers 2, one staminate of 3 stamens, the other pistillate with a single pistil. Perianth none. Style slender, not jointed to the ovary; stigmas 3. Achenes obtusely 3-angled.

1. *E. Bellardi* (All.) C. Koch. Densely tufted; stems slender, 1-4 dm. high; old sheaths fibrillose, brown; leaf-blades revolute; spikelet subtended by a short bract or bractless, 15-30 mm. long, 3-4 mm. wide; achenes appressed, ellipsoid, 2 mm long or less. Arctic-alpine situations. Greenl.—Alta.—n N M.—Öre.—Alaska; Eurasia. *Alp.* Je-Au.

13. CAREX (Rupp.) L. SEDGE.*

Grass-like sedges, perennial by rootstocks. Culms mostly triangular, often strongly phyllopodic or aphylllopodic. Leaves 3-ranked, the upper (bracts) elongate or short, and subtending the spikes of flowers or wanting. Plants monoecious or sometimes dioecious; flowers solitary in the axils of scales (glumes). Spikes one to many, either wholly pistillate, wholly staminate, androgynous or gynaeandrous. Perianth none. Staminate flowers of three (or rarely two) stamens, the filaments filiform. Pistillate flowers of a single pistil, with a style and two or three stigmas. Achene completely surrounded by the perigynium, or rarely rupturing it in ripening, 3-angled, lenticular or plano-convex. Rhacheola occasionally developed.

Spike one, androgynous; perigynia glabrous, thin, not margined or triangular, beaked; style withering, not continuous with the achene, stigmas three.
Pistillate scales persistent, perigynia not stipitate, not becoming reflexed.
Spike linear or linear-oblong, perigynia not inflated. 1. NARDINAE.
Spike orbicular to short-ovoid; perigynia inflated. 2. INFLATAE.
Pistillate scales deciduous, perigynia stipitate, at least the lower reflexed at maturity. 3. ATHROCHLAENAE.

* Contributed by Mr. Kenneth K. Mackenzie.

- Spikes one to many; if one, plant not as above
 Achenes lenticular and stigmas two, lateral spikes sessile; terminal spike partly
 pistillate, or if staminate, the lateral spikes short, or heads dioecious
 Spike one.
 Spike orbicular to short-ovoid 4 CAPITATAE
 Spike linear. 5 DIOICAE
 Spikes more than one
 Perigynia not white-puncticulate
 Rootstocks long-creeping, the culms arising singly or few together.
 Perigynia not thin or wing-margined, the beak obliquely cut
 Culms not branching.
 Spikes densely aggregate into a globular-ovoid head, appearing
 like one spike 6. FOETIDAE
 Spikes distinct 7 DIVISAE
 Culms becoming decumbent and branching 8 CHORDORRHIZAE
 Perigynia thin or wing-margined, the beak bidentate 9 ARENARIAE
 Rootstock not long-creeping, the culms densely caespitose
 Spikes androgynous
 Perigynia abruptly contracted into the beak.
 Spikes few (ten or less), perigynia green or tinged with reddish
 brown 10. MUHLENBERGIANAE
 Spikes numerous; perigynia yellowish or brownish
 Perigynia yellowish, opaque part of leaf-sheath transversely
 rugulose 11 MULTIFLORAE
 Perigynia brownish; opaque part of leaf-sheath not trans-
 versely rugulose 12 PANICULATAE
 Perigynia tapering into the beak 13 STENORHYNCHIAE
 Spikes gynaeandrous or pistillate or rarely staminate
 Perigynia at most thin-edged
 Perigynia spreading at maturity 14 STELLULATAE
 Perigynia appressed 15 DEWEYANAE
 Perigynia narrowly to broadly wing-margined
 16 OVALES
 17 CANESCENTES
 Perigynia white-puncticulate
 Achenes triangular or lenticular. If lenticular, lower lateral spikes conspicuously
 peduncled, or terminal spike staminate and lateral spikes elongated
 Achenes strongly constricted at base, rounded at apex. 18 PHYLLOSTACHYAE
 Achenes not strongly constricted at base, pointed at apex.
 Spike one; perigynia rounded and beakless at apex 19 POLYTRICHOIDEAE
 Spikes one or more, when one, perigynia not both rounded and beakless at
 the apex
 Perigynia both coriaceous and shining, the beak obliquely cut
 Spike solitary. 20 OBTUSATAE
 Spikes several. 21. NITIDAE
 Perigynia not both coriaceous and shining
 Spike one, perigynia triangular, glabrous, not reflexed or flattened.
 Perigynia prominently beaked, finely many-nerved
 22 RUPESTRES
 Perigynia nearly beakless, 2-keeled but otherwise nerveless
 23 FIRMICULMES.
 Spikes one to many; when one, perigynia differing from above
 Perigynia closely enveloping the achene, strongly tapering at base,
 pubescent or puberulent; bracts sheathless or nearly so
 Spike normally one.
 Spikes androgynous, leaf-blades very narrow
 24. FILIFOLIAE
 Spikes dioecious 25. SCIRPINAE
 Spikes two or more 26 MONTANAE
 Perigynia not as above, or if so, bracts strongly sheathing
 Lowest bract long-sheathing, its blades rudimentary
 Leaf-blades flat, perigynia puberulent or pubescent
 27 DIGITATAE
 Leaf-blades filiform; perigynia glabrous
 28. ALBAE
 Lowest bract sheathless or long-sheathing, if long-sheathing, its
 blade well-developed.
 Lowest bract strongly sheathing; perigynia never strongly
 bidentate with stiff teeth
 Achenes lenticular, stigmas two. 29. BICOLORES.
 Achenes triangular; stigmas three
 Scales not dark-tinged.
 Pistillate spikes short-oblong to linear, erect
 Perigynia tapering at base, triangular, closely
 enveloping the achenes
 Rootstock long-creeping
 30 PANICEAE
 Rootstock not long-creeping
 31 LAXIFLORAE.

- Perigynia rounded at base, suborbicular in cross-section, loosely enveloping achenes.
32. GRANULARES
Plistillate spikes elongate, linear to cylindric, slender peduncled, the lower drooping.
Culms strongly reddish tinged at base, aphyllorhizous. 33. DEBILES.
Culms not strongly reddish tinged at base, aphyllorhizous.
Spikes slender, few-flowered; perigynia 4 mm long or less, not inflated, the beak not becoming bidentate.
34. CAPILLARES.
Spikes dense, many-flowered; perigynia longer, more or less inflated, the beak becoming bidentate.
35. LONGIROSTRES.
Scales dark-tinged. 36. FRIGIDAE.
Lowest bract sheathless, or sheathing; if sheathing, perigynia strongly bidentate with stiff teeth.
Foliage pubescent, perigynia not bidentate.
37. PALLESCENTES.
Foliage glabrous, or if rarely pubescent, perigynia bidentate.
Perigynia rough-papillose. 38. ANOMALAE.
Perigynia at most granular-roughened.
Perigynia beakless or very short-beaked; achenes triangular.
Perigynia glaucous. 39. LIMOSAE.
Perigynia not glaucous.
40. ATRATAE.
Perigynia with strongly bidentate beak, or if not, achenes lenticular.
Achenes lenticular, perigynia dull.
41. ACUTAE.
Achenes triangular, or if rarely lenticular, perigynia shining.
Perigynia coriaceous, little if at all inflated, often pubescent; bracts sheathless.
42. HIRTAE.
Perigynia glabrous, often inflated, if rarely coriaceous, the bracts sheathing.
Perigynia little inflated; lower bract strongly sheathing.
43. EXTENSAE.
Perigynia little to much inflated; lower bract not strongly sheathing.
Spike one. 44. PAUCIFLORAE.
Spikes more than one.
Perigynia finely and closely ribbed.
45. PSEUDO-CYPHEREAE.
Perigynia coarsely ribbed or nerveless.
46. PHYSOCARPAE.
1. NARDINAE.
Represented by one species in our range. 1. *C. Hepburnii*.
2. INFLATAE.
Represented by one species in our range. 2. *C. Engelmannii*.
3. ATHROCHLAENAE.
Densely caespitose; leaf-blades involute, 1 mm wide, staminate flowers few; perigynia erect until full maturity. 3. *C. pyrenaica*.
Short-stoloniferous; leaf-blades flat, 1.5 mm. wide or more, staminate flowers conspicuous; perigynia early deflexed. 4. *C. nigricans*.
4. CAPITATAE.
Represented by one species. 5. *C. capitata*.
5. DIOICAE.
Represented by one species in our range. 6. *C. gynocrates*.
6. FOETIDAE.
Leaf-blades 2-3.5 mm wide; perigynium little exceeding the scale at maturity. 7. *C. vernacula*.
Leaf-blades 1.5 mm. wide or less; perigynium much exceeding the scale at maturity. 8. *C. perglobosa*.
Perigynia membranous, not stipitate. 9. *C. incurviformis*.
Perigynia not membranous, stipitate.

7. DIVISAE.

- Rootstocks slender, light brownish; culms obtusely triangular, normally smooth; leaf-blades narrowly involute
 Perigynia long-beaked; heads dioecious or nearly so 10. *C. Douglasii*.
 Perigynia short-beaked; heads androgynous. 11. *C. stenophylla*.
 Rootstocks stout; culms acutely triangular, normally rough above.
 Perigynia not strongly nerved ventrally, leaf-sheaths hyaline.
 Perigynia chestnut, thick, the beak about one-fifth as long as the body 12. *C. simulata*.
 Perigynia blackish in age, plano-convex, the beak one-third to one-half as long as the body. 13. *C. praegracilis*.
 Perigynia strongly nerved ventrally, upper leaf-sheaths green-striate opposite the blades. 14. *C. Sartwellii*.

8. CHORDORRHIZAE

- Represented by one species in our range 15. *C. chordorrhiza*

9. ARENARIAE.

- Represented by one species in our range. 16. *C. siccata*

10. MUHLENBERGIANAE.

- Sheaths tight, inconspicuously, if at all, septate-nodulose
 Densely caespitose; head ovoid, capitate, perigynia serrulate to the middle 17. *C. Hoodii*.
 Rootstocks elongate, head linear, interrupted; perigynia serrulate at the apex only
 Scales obtuse to short-cuspidate, not concealing the spreading perigynia.
 Spikes with conspicuous staminate flowers, scales half as long as the perigynia 18. *C. raiicola*.
 Spikes with inconspicuous staminate flowers, scales about as long as the perigynia 19. *C. occidentalis*.
 Scales strongly cuspidate, concealing the appressed perigynia 20. *C. Hookeriana*.
 Sheaths loose and membranous, easily breaking, conspicuously septate-nodulose 21. *C. gravis*.

11. MULTIFLORAE.

- Represented by one species in our range 22. *C. vulpinoidea*.

12. PANICULATAE

- Culms loosely caespitose; sheaths not copper-tinged at the mouth, head little interrupted, perigynia 2-2.75 mm. long, shining, not concealed by the scales 23. *C. diandra*.
 Culms densely caespitose, sheaths copper-tinged at the mouth, head interrupted, perigynia 2.5-4 mm. long, dull, concealed by the scales
 Leaves 1-2.5 mm. wide, perigynia 2.5-3 mm. long, scales tinged with reddish brown 24. *C. prairea*.
 Leaves 2.5-6 mm. wide; perigynia 3-4 mm. long, scales chestnut-tinged 25. *C. Cusickii*.

13. STENORHYNCHAE.

- Perigynia 3-4 mm. long, the beak much shorter than the body, scales strongly dark-tinged
 Leaves clustered at base; sheaths not cross-rugulose ventrally; culms slender. 26. *C. Jonesii*.
 Leaves not clustered at base; sheaths cross-rugulose ventrally, culms stout. 27. *C. nerrina*.
 Perigynia 4-6 mm. long, the beak longer than the body, scales not dark-tinged 28. *C. stipata*.

14. STELLULATAE

- Spikes in a small (6-10 mm. long) densely capitate brownish black head 29. *C. illota*.
 Spikes more or less widely separate, not brownish black.
 Perigynia broadest in middle, the beak sparingly serrulate; culms weak 30. *C. laericulmis*.
 Perigynia broadest near base, the beak strongly serrulate; culms stiff
 Beak of the perigynia one-fourth as long as the body, the teeth short, and ventral suture inconspicuous. 31. *C. interior*.
 Beak of the perigynia longer, strongly bidentate, the ventral suture conspicuous 32. *C. angustior*.

15. DEWEYANAE.

- Culms densely caespitose, perigynia tapering at base, 4-5 mm. long, the upper part of the body covered by translucent scale. 33. *C. Deweyana*.
 Rootstocks slender, elongate, perigynia substipitate, 3.5-4.5 mm. long
 Perigynia shallowly bidentate, the upper part of body not covered by the scale. 34. *C. leptopoda*.
 Perigynia deeply bidentate, the body covered by the scale. 35. *C. Bolanderi*.

16. OVALES.

- Lower bract or bracts conspicuous, several-many times the length of the head.
 Perigynia subulate, the beak much longer than body, lower bracts more than 1 dm. long, without yellowish brown margins at base. 36. *C. sychnocephala*.

- Perigynia lance-ovate, the beak shorter than the body; longer bracts less than 1 dm. long, with yellowish brown margins at base.
 Perigynia nerveless ventrally, tawny at orifice 37. *C. athrostachya*.
 Perigynia nerved ventrally, hyaline at orifice 38. *C. tenuistrois*.
- Bracts not conspicuous, rarely slightly exceeding the head.
 Beak of the perigynia flattened and serrulate to tip, often strongly bidentate.
 Scales about the length of the perigynia and nearly of the same width above, the perigynia nearly entirely concealed.
 Head stiff, the spikes approximate.
 Perigynia less than 5 mm long, at most faintly nerved on inner face, loosely ascending; spikes suborbicular; lower bracts prominent, stiff. 39. *C. adusta*.
- Perigynia 5.5–7 mm long, finely many-nerved on inner face, appressed; spikes oblong-elliptic, bracts not stiff. 40. *C. petasata*.
 Head not stiff, flexuous or moniliform 41. *C. aenea*.
- Scales shorter than perigynia and noticeably narrower above, the upper part of perigynia largely exposed.
 Perigynia subulate to lanceolate, at least 2½ times as long as wide.
 Perigynia subulate, the margin at the base almost obsolete. 42. *C. Crawfordii*.
- Perigynia lanceolate, the margin conspicuous to the base. 43. *C. scoparia*.
- Perigynia ovate-lanceolate or broader, at most twice as long as wide.
 Perigynia narrowly to broadly ovate, 3–4 mm long.
 Perigynia brownish, spikes closely aggregate, rounded at base. 44. *C. Bebbii*.
- Perigynia green, spikes contiguous to widely separate, usually tapering at base.
 Leaf-blades 2.5 mm. wide or less, perigynia spreading-ascending; culms slender 45. *C. tenera*.
 Leaf-blades 2–6 mm wide (averaging 4 mm), perigynia appressed-ascending, culms stout 46. *C. tinctoria*.
- Perigynia ovate or broader, 3.75–6 mm. long.
 Perigynia thick, abruptly short-beaked, scales little, if at all, tinged with brownish red 47. *C. brevior*.
 Perigynia thin, tapering to the beak; scales strongly tinged with chestnut-brown 48. *C. Egglestonii*.
- Beak of the perigynia slender, terete and scarcely, if at all, serrulate towards tip, obliquely cut, at times becoming obscurely bidentate.
 Scales about the length of the perigynia, and of nearly the same width above, the perigynia nearly entirely concealed.
 Culms and head stiff and rigid.
 Culms 1–3 dm. high, in large stools; scales strongly tinged with reddish brown, perigynia lanceolate. 49. *C. phaeocephala*.
 Culms taller, not in large stools, scales lighter-colored; perigynia ovate, in age golden yellow at base 50. *C. zeranthica*.
- Culms slender; head flexuous or moniliform.
 Scales light reddish brown tinged 51. *C. practicola*.
 Scales chestnut-brown tinged 52. *C. Piperi*.
- Scales shorter than perigynia and noticeably narrower above, the upper part of perigynia largely exposed.
 Perigynia thin and membranous, except where distended by the achene.
 Perigynia 3.5–5 mm long, culms slender.
 Perigynia lance-ovate, very narrowly margined, spreading; culms biennial 53. *C. micraptera*.
 Perigynia ovate, strongly margined, appressed, culms annual 54. *C. fugitivella*.
- Perigynia 4.5–6 mm long; culms low.
 Perigynia lanceolate to broadly ovate, nerveless or nearly so on inner face, the beaks conspicuous, culms slender, ascending or decumbent 55. *C. nubicola*.
 Perigynia narrowly lanceolate, finely nerved on inner face, the beaks appressed; culms stiff, erect. 56. *C. ebenea*.
- Perigynia strongly plano-convex, the walls thick.
 Spikes densely capitate, beak of the perigynia obliquely cut, dark-tipped. 57. *C. pachystachya*.
 Spikes not capitate, beak of the perigynia bidentate, reddish-tipped. 58. *C. Preslii*.

17. CANESCENTES.

- Spikes androgynous; perigynia unequally bilconvex 59. *C. disperma*.
 Spikes gynaeceandrous; perigynia plano-convex.
 Lowest bract bristle-like, much prolonged, many times exceeding its 1–5-flowered spike, spikes widely separate. 60. *C. trisperma*.
 Lowest bract much shorter or none; spikes several-many-flowered, the upper approximate.
 Spikes 2–4, subglobose, closely approximate, forming an ovate or subglobose head, perigynia scarcely beaked, scales white-hyaline. 61. *C. tenuiflora*.
 Spikes one-many, the lower more or less strongly separate; head elongate; perigynia shortly to strongly beaked, scales darker.
 Perigynia broadest near middle, beak short, smooth or moderately serrulate.

- Beak of the perigynia smooth or very nearly so; scales obtuse to acutish, strongly tinged with reddish brown or chestnut, spikes closely approximate.
 Terminal spike strongly tapering at base, culms rough at apex only 62. *C. Lachenali*
 Terminal spike little tapering at the base, culms usually very rough 63. *C. Heleonastes*
- Beak of the perigynia serrulate, or if smooth scales acutish to cuspidate and scarcely, if at all, tinged with reddish brown, lower spikes remote
 Plant glaucous, leaf-blades 2-4 mm wide, spikes many-flowered, perigynia scarcely beaked, appressed ascending, with emarginate or entire orifice 64. *C. canescens*
 Plant not glaucous; leaf-blades 1-2.5 mm wide, spikes fewer-flowered, perigynia distinctly beaked, loosely spreading, with minutely bidentate orifice 65. *C. brunneus*
 Perigynia ovate, broadest near the base, beak conspicuous, strongly serrulate. 66. *C. arcta*
18. PHYLLOSTACHYAE.
 Perigynia with long smooth beak, foliage deep green. 67. *C. durifolia*
 Perigynia with short sparingly serrulate beak, foliage light or glaucous green 68. *C. saximontana*
19. POLYTRICHOIDEAE.
 Represented by one species. 69. *C. leptalea*
20. OBTUSATAE.
 Represented by one species. 70. *C. obtusata*
21. NITIDAE.
 Represented by one species in our range. 71. *C. supina*
22. RUPESTRES.
 Represented by one species. 72. *C. rupestris*
23. FIRMICULMES.
 Represented by one species in our range. 73. *C. Geyeri*
24. FILIFOLIAE
 Leaf-blades filiform at base, 0.25-0.5 mm wide, culms filiform, obtusely triangular, smoothish; lowest scale rarely awned
 Perigynia sharply triangular below, obpyramidal; basal sheaths rarely filamentose. 74. *C. clynoidea*
 Perigynia rounded on the angles, obovoid to globose, basal sheaths filamentose. 75. *C. filifolia*
 Leaf-blades flattened at base, 1-2 mm wide; culms stoutish, sharply triangular, often much roughened; lowest scale conspicuously awned. 76. *C. orocharis*
25. SCIRPINAE.
 Culms phyllopodic, the culm-leaves 6-10, scales concealing perigynia 77. *C. pseudoscirpoidea*
 Culms aphyllopodic, the culm-leaves 3-6; scales shorter than perigynia.
 Perigynia lanceolate, flattish, 4 mm. long. 78. *C. stenochlaena*
 Perigynia broader, triangular, 3 mm. long or less.
 Scales very minutely hyaline-margined; perigynia whitish-pubescent. 79. *C. scirpoidea*
 Scales very broadly hyaline-margined; perigynia yellowish-hirsute 80. *C. scirpiformis*
26. MONTANAE.
 Basal spikes absent.
 Long stoloniferous; scales about equaling the perigynia 81. *C. heliophila*
 Without long stolons, scales much shorter than the perigynia 82. *C. Peckii*
- Basal spikes present
 Lower bract exceeded by the culm, scale-like, hyaline-margined at base 83. *C. umbellata*
 Lower bract normally exceeding the culm, leaf-like, not hyaline-margined at base
 Perigynia 2.75 mm. long or less, shallowly bidentate, rootstocks slender. 84. *C. deniera*
 Perigynia longer, deeply bidentate, culms densely caespitose. 85. *C. Rossii*
27. DIGITATAE.
 Basal spikes present; scales abruptly cuspidate. 86. *C. pedunculata*
 Basal spikes absent; scales not abruptly cuspidate
 Staminate spike 3-6 mm. long, scales obtuse, one-half as long as the perigynia. 87. *C. concinna*
 Staminate spike 8-22 mm long; scales acute to acuminate, from little shorter than to exceeding the perigynia
 Perigynia loosely pubescent, wider and longer than the scales; staminate spike nearly sessile, pistillate spikes few-flowered 88. *C. concinnoides*
 Perigynia appressed-pubescent, narrower and shorter than the scales; staminate spike noticeably peduncled; pistillate spikes many-flowered 89. *C. Richardsonii*

28. ALBAE.

Represented by one species in our range.

90. *C. eburnea*.

29. BICOLORES.

Mature perigynia whitish, ellipsoid, not fleshy or translucent.

91. *C. Hassel*.

Mature perigynia orange or brownish, broader, fleshy, translucent.

92. *C. aurea*.

30. PANICEAE.

Beak of the perigynia none or very short.

Sheaths of the bracts short, plant glaucous; leaf-blades involute, spikes approximate.

93. *C. livida*.

Sheaths of the bracts long; plant not glaucous, leaf-blades flat, spikes distant.

Fertile culm-blades 3-5, 2-3.5 mm. wide, perigynia 3.5 mm. long or less, spikes linear

94. *C. tetanica*.

Fertile culm-blades 6-10, 3-7 mm. wide, perigynia longer; spikes ohlong or linear-ohlong.

95. *C. Meadit*.

Beak of the perigynia straight, prominent.

96. *C. vaginata*.

31. LAXIFLORAE.

Represented by one species in our range

97. *C. blanda*.

32. GRANULARES.

Plants caespitose; bracts elongate, overtopping the spikes; staminate spike short-stalked.

98. *C. Shrevei*.

Plants with long-creeping rootstocks; bracts short, rarely overtopping the spikes; staminate spike long-stalked.

99. *C. Crawei*.

33. DEBILES.

Represented by one species in our range

100. *C. Assiniboienensis*.

34. CAPILLARES.

Represented by one species in our range.

101. *C. capillaris*.

35. LONGIROSTRES.

Represented by one species in our range.

102. *C. Sprengelii*.

36. FRIGIDAE.

Terminal spike staminate or gynaeandrous, the lateral ones pistillate.

Terminal spike usually gynaeandrous, the lateral ones ovoid or short-ohlong.

103. *C. misandra*.

Terminal spike staminate (or with a few perigynia), the lateral ones ohlong or linear-cylindric.

Perigynia triangular, slightly compressed.

104. *C. lusulina*.

Perigynia strongly compressed.

105. *C. fissuricola*.

Terminal spike androgynous, the upper lateral staminate, the lower pistillate.

Perigynia lanceolate, 1.5 mm. wide, tapering to the apex, spikes 2-5, usually 4.

106. *C. petricosa*.

Perigynia ohlong-oval, 2.25 mm. wide, abruptly minutely beaked; spikes more numerous.

107. *C. Franklinii*.

37. PALLESCECENTES.

Represented by one species in our range.

108. *C. abbreviata*.

38. ANOMALAE.

Represented by one species in our range.

109. *C. amplifolia*.

39. LIMOSAE.

Pistillate spikes drooping.

Plants strongly stoloniferous; leaf-blades involute, glaucous, 3 mm. wide or less; scales little exceeding the perigynia.

110. *C. limosa*.

Plant tufted, leaf-blades flat, not glaucous, wider; scales much exceeding the perigynia.

111. *C. paupercula*.

Pistillate spikes erect.

112. *C. Buxbaumii*.

40. ATRATAE.

Terminal spike in some plants pistillate and linear-cylindric or staminate only at apex, in others staminate.

Scales not long-pointed, little exceeding the perigynia, perigynia flattened, sharp-edged.

113. *C. Parryana*.

Scales long-pointed, 2-3 times as long as the perigynia; perigynia little flattened.

114. *C. idaho*.

Terminal spike staminate or gynaeandrous, not pistillate and linear-cylindric.

Terminal spike staminate.

Culms few-leaved, strongly aphyllipodic, purplish tinged at base.

Staminate scales obtuse, the midvein nearly or quite obsolete.

Staminate scales obovate; pistillate scales with obsolete (or nearly so) midvein, perigynia nerveless.

115. *C. podocarpa*.

Staminate scales linear-lanceolate; pistillate scales with strong midvein, perigynia 2-nerved.

116. *C. venustula*.

Staminate scales with conspicuous more or less excurrent midvein.

117. *C. spectabilis*.

- Culms many-leaved, clothed at base with dried-up leaves of previous year, not purplish tinged at base.
- Perigynia flat 118. *C. Tolmiei*
- Perigynia round in cross-section, many-nerved. 119. *C. Raynoldsii*.
- Terminal spike gynaeceandrous
- Perigynia triangular in cross-section, nerveless or nearly so, 2.5 mm. long or less
- Perigynia longer, many-nerved or with two prominent marginal nerves, more or less strongly flattened.
- Spikes contiguous, sessile or short-peduncled, forming a dense head, culms stiff, erect
- Perigynia subinflated-triangular, scarcely compressed, the beak 1 mm. long. 121. *C. Nelsonii*.
- Perigynia strongly compressed, the beak 0.5 mm. long.
- Lowest spike slightly separate, short-peduncled, scales black, with very conspicuous white hyaline apex and upper margins
- Spikes closely contiguous and sessile, scales black with inconspicuous hyaline apex and margins 122. *C. albo-nigra*
- Lowest spike (or spikes) strongly peduncled, usually distant, erect or nodding 123. *C. nora*.
- Spikes 3-5, not oblong-cylindrical, walls of the perigynia not papery; perigynia 2.5-4.5 mm. long, nerveless or obscurely nerved on the face, dull green to brownish black; scales from a little shorter to a little longer than the perigynia
- Perigynia slightly inflated and sub-triangular, not strongly compressed 124. *C. atrosquama*.
- Perigynia strongly compressed
- Perigynia sharp-edged, the margins much narrower than the achene, lateral spikes linear
- Scales shining, with the midvein conspicuous the whole length, exceeded by the perigynia. 125. *C. bella*.
- Scales dull with inconspicuous midvein, about covering the perigynia. 126. *C. atratiformis*
- Perigynia widely margined, the margins as wide as the achene, lateral spikes oblong or linear-oblong or ovoid.
- Perigynia granular-roughened, achenes short-stipitate
- Upper pistillate scales exceeding the perigynia, lateral spikes ovoid, lowest peduncle less than the length of the spike 127. *C. chalciolepis*
- Upper pistillate scales exceeded by the perigynia, lateral spikes oblong or linear-oblong, lowest peduncle 1-2 times as long as the spike 128. *C. atrata*
- Perigynia smooth, achenes strongly stipitate. 129. *C. epapillosa*
- Spikes 6-10, oblong-cylindrical, walls of the perigynia papery, perigynia 5 mm. long, lightly 3-nerved, light green, much shorter than the perigynia. 130. *C. Mertensii*.
41. ACUTAE.
- Culms phyllopodic
- Beak of the perigynia, if present, not deeply bidentate
- Lowest bract exceeded by the inflorescence; scales with obsolete or slender midvein; culms low, stiff, solitary or in small clumps, freely stoloniferous
- Perigynia plano-convex, punctulate, appressed. 131. *C. concolor*
- Perigynia soon turgid, papillose, spreading
- Scales ovate, exceeded by the perigynia 132. *C. scopulorum*.
- Scales lanceolate, exceeding the perigynia 133. *C. chimaphila*
- Lowest bract exceeding the inflorescence; scales usually with a slender midvein or broad light-colored center, culms taller, less stiff, in larger clumps
- Perigynia turgid, spreading 134. *C. aperta*.
- Perigynia not turgid, appressed or ascending
- Stolons absent, perigynia conspicuously nerved; leaf-blades 1-3 mm. wide.
- Perigynia substipitate, glaucous, granular-roughened all over, the body two-thirds as wide as long 135. *C. lenticularis*
- Perigynia strongly stipitate, green, granular-roughened at the apex only, the body half as wide as long. 136. *C. Kelloggii*.
- Stolons present, long; perigynia nerveless or inconspicuously nerved; leaf-blades 2-6 mm. wide
- Perigynia narrowly to very broadly elliptic, broadest below apex, less than 3 mm. long, 1-1.5 mm. wide. 137. *C. aquatilis*
- Perigynia strongly obovate, broadest at the apex, 3 mm. long, 1.75 mm. wide. 138. *C. substricta*
- Beak of the perigynia markedly bidentate, the body strongly ribbed. 139. *C. nebraskensis*.
- Fertile culms aphyllopodic.
- Lower sheaths smooth, scales not blackish 140. *C. Emoryi*
- Lower sheaths strongly hispidulous, scales blackish. 141. *C. prionophylla*.
42. HIRTAE
- Beak of the perigynia much shorter than the body, the teeth 1 mm. long or less
- Perigynia glabrous to sparsely pubescent. 142. *C. lacustris*.

- Perigynia densely or strongly pubescent
 Nerves of the perigynia obscured by pubescence, the teeth of beak short
 Leaf-blades flat, more than 2 mm. wide 143. *C. lanuginosa*.
 Leaf-blades involute, 2 mm. wide or less 144. *C. lasiocarpa*.
 Nerves of the perigynia prominent, the teeth of beak prominent, slender.
 145. *C. Houghtonii*.
- Back of the perigynia including teeth nearly as long as body, the teeth 1.5 mm. long or more
- Perigynia glabrous
 Perigynia ovoid, the teeth less than 2 mm. long, erect or spreading, scales acute to aristate, leaf-blades glabrous. 146. *C. laevigata*.
 Perigynia lanceolate or ovoid-lanceolate, the teeth 2-4 mm. long, widely spreading, scales long-aristate, leaf-blades pubescent beneath 147. *C. atherodes*.
 148. *C. Sheldonii*.
- Perigynia hairy. 43. EXTENSAE
- Perigynia 2-3 mm. long, the beak scarcely half as long as the body. 149. *C. viridula*.
 Perigynia 4-6 mm. long, the beak about as long as the body. 150. *C. flava*.
44. PAUCIFLORAE.
- Rhacheola present, conspicuously exerted; culms with many leaves 151. *C. microglochin*.
 Rhacheola absent or rudimentary, not conspicuously exerted; culms with few leaves. 152. *C. pauciflora*.
45. PSEUDO-CYPERAE
- Perigynia suborbicular in cross-section, more or less inflated 153. *C. hystrixina*.
 Perigynia obtusely triangular, scarcely inflated, closely enveloping achene 154. *C. comosa*.
46. PHYSOCARPAE.
- Perigynia scarcely inflated, beak entire or emarginate; stigmas normally two and achenes lenticular
- Perigynia lanceolate, fertile culms filamentose at the base; rootstocks creeping 155. *C. miliartii*.
 Perigynia ovoid, fertile culms rarely if ever filamentose at the base; plant loosely stoloniferous 156. *C. saxatilis*.
- Perigynia from little to much inflated; beak bidentate, stigmas normally three and achenes triangular. 157. *C. oligosperma*.
 Pistillate spikes globose or short-oblong, 5-15-flowered
 Pistillate spikes oblong to cylindric, 15-many-flowered
 Lower perigynia not reflexed, bracts moderately exceeding the spikes
 Perigynia ascending, lower sheaths more or less strongly filamentose, culms sharply triangular
 Perigynia 6-8 mm. long.
 Perigynia oblong-ovoid, tapering into the beak; spikes loosely flowered at base 158. *C. Raeanii*.
 Perigynia ovoid or globose-ovoid, contracted into the beak; spikes more closely flowered. 159. *C. vesicaria*.
 Perigynia 8-10 mm. long, tapering into the beak 160. *C. exsiccata*.
 Perigynia spreading at maturity, lower sheaths not filamentose; culms bluntly triangular below the spikes 161. *C. rostrata*.
 Lower perigynia reflexed, bracts many times exceeding the spikes. 162. *C. retrorsa*.

1. NARDINAE Kükenth. Very densely caespitose. Leaf-blades filiform. Spike solitary, linear-oblong, androgynous, densely flowered, bractless. Perigynia ascending, biconvex, elliptic-ovate, not inflated, the walls thin, glabrous, striate, stipitate, the beak hyaline-tipped, in age bidentulate. Achenes lenticular or triangular. Stigmas 2 or 3.

1. *C. Hepburnii* Boott. Culms 2-15 cm. high; sheaths strongly hyaline-margined above, abruptly contracted into the blades; spike 5-12 mm. long, with 1-10 perigynia; scales ovate, acutish, the midvein conspicuous; perigynia 3 mm. long; achenes usually triangular. *C. nardina* Auth., in part. *C. stantonensis* M. E. Jones. Dry alpine slopes: Alta.—Colo.—Wash.—B.C. *Alp. Subalp.* Jl—Au.

2. INFLATAE Kükenth. Caespitose, the rootstocks elongate. Leaf-blades filiform. Spike solitary, ovoid, androgynous, densely flowered, bractless. Perigynia inflated, the walls very thin, slightly nerved, sessile, the smooth beak hyaline tipped, obliquely cut, in age bidentulate. Achenes triangular. Stigmas three.

2. *C. Engelmannii* Bailey. Culms 5-20 cm. high; leaf-blades about 0.5 mm. wide; spike with 15-40 ascending perigynia; scales 1-nerved, acute to cuspid.

date; perigynia ovate, 4.5–5 mm. long, tapering at apex; achenes 1.25 mm. long. Isolated stations on mountain summits: Colo.; Wyo.; Wash. *Alp.*—*Subalp.* Au.

3. *ATHROCHLAENAE* Holm. Cespitose or with creeping rootstocks. Leaf-blades narrow. Spike solitary, androgynous, bractless, narrow, densely many-flowered. Pistillate scales soon falling. Perigynia slenderly strongly stipitate, widely spreading or the lower reflexed, obscurely triangular, nerveless, membranaceous, long-beaked, the beak obliquely cut, becoming bidentulate. Achenes usually triangular. Stigmas 3, or occasionally 2.

3. *C. pyrenaica* Wahl. Culms 3–20 cm. high, wiry, slender, smooth; leaves 2–3 to a fertile culm; spike 5–20 mm. long, 3–5 mm. wide; scales chestnut tinged; perigynia 3–4 mm. long. Alpine localities: Mack.—Colo.—Ore.—Alaska; Eurasia. *Alp.*—*Subalp.* Jl–S.

4. *C. nigricans* C. A. Meyer. Culms 5–20 cm. high, stiff, firm, smooth; leaves 4–9 to a fertile culm; spike 8–15 mm. long, 6–9 mm. wide; scales dark brown tinged; perigynia 4 mm. long. Alpine localities: Alta.—Colo.—Calif.—Alaska. *Alp.*—*Mont.* Jl–S.

4. *CAPITATAE* Christ. Cespitose, the rootstocks somewhat elongate. Leaf-blades filiform. Spike solitary, ovoid, androgynous, densely flowered, bractless. Perigynia plano-convex, sharp-edged, not inflated, the walls thinnish, essentially nerveless, sessile, the smooth beak conspicuously hyaline-tipped, in age bidentulate. Achenes lenticular. Stigmas 2.

5. *C. capitata* L. Culms 1–2 dm. high; leaf-blades about 0.5 mm. wide; spike with 6–25 ascending perigynia; scales ovate-orbicular, obtuse; perigynia 2–2.5 mm. long, and about as broad, abruptly beaked. An arctic species also occurring very locally on mountain summits southward: Greenl.—Alaska; also N.H.; Alta.; Calif.; Nev.; Mex.; Eu. *Alp.* Je–Au.

5. *DIOICAE* Tuckerm. Rootstocks elongate. Culms slender. Leaf-blades filiform. Spike solitary, bractless, staminate, pistillate or androgynous, narrow. Perigynia at length widely spreading, plano- or bi-convex, not inflated, subcoriaceous, glabrous, nerved, rounded and spongy at base, sharp-edged, strongly beaked, the apex hyaline, in age bidentulate. Achenes lenticular. Stigmas 2.

6. *C. gynocrates* Wormskj. Culms 1–3 cm. high, smooth; rootstocks horizontal; spike 5–15 mm. long, 2–5 mm. wide; scales sharp-pointed, reddish brown; perigynia few, 3 mm. long, biconvex, nerved, narrowed into a rough beak half as long as the body. Sphagnum swamps: Greenl.—N.Y.—Mich.—Colo.—Alaska; Siberia. *Alp.*—*Mont.* Southward local. My–Au.

6. *FOETIDAE* Tuckerm. Rootstocks elongate, dark-colored, the culms arising singly or a few together. Leaf-blades narrow. Spikes few to several, androgynous, aggregated into a dense subglobose or ovoid head. Perigynia spreading, plano-convex, membranaceous, usually obsoletely nerved, loosely enveloping the achene, rounded at the base, stipitate, the beak obliquely cut, at times bidentulate. Achenes lenticular. Stigmas 2.

7. *C. vernacula* Bailey. Culms 1–2 dm. high, smooth; leaf-blades 5–12 cm. long, stiff; head very dense, globose, about 1 cm. in diameter; perigynia ovoid, 3.5–4 mm. long, 1.5 mm. wide, scarcely inflated, more or less nerved. Alpine slopes: Wyo.—Colo.—Calif.—Wash. *Alp.* Jl–Au.

8. *C. perglobosa* Mackenzie. Culms 1–1.5 dm. high, smooth; leaf-blades 2–8 cm. long; head very dense, globose, about 1 cm. in diameter; perigynia ovoid-elliptic, 4 mm. long, 2.25 mm. wide, membranous, not stipitate, more or less inflated. *C. incurva* Lightf. var. *chartacea* Kukenth. Alpine ridges: Colo. *Alp.* Au–S.

9. *C. incurviformis* Mackenzie. Culms 2–5 cm. high, smooth, obtusely angled; leaf-blades 2–4 cm. long; head dense, globose, 7–9 mm. in diameter; scales lance-ovate, chestnut with narrow hyaline margins, acuminate; perigynia

elliptic-lanceolate, 3.5 mm. long, 1.25 mm. wide, finely conspicuously many-nerved, not inflated, nor membranous, stipitate. Alpine ridges: Alta. Alp. Jl.

7. *DIVISAE* Christ. Rootstocks long-creeping, dark-colored, tough, the culms arising singly or in small clumps at intervals, mostly stiff, dark-tinged at the base, aphyllopodic. Leaf-blades narrow. Spikes few to many, more or less closely aggregated into an oblong or oblong-ovoid head, androgynous or dioecious, ovoid or oblong. Heads in some species dioecious or nearly so. Lowest one or several of the lower bracts developed, short-prolonged, the others bract-like. Perigynia appressed-ascending, plano-convex, smooth, often shining, coriaceous, more or less nerved on outer and nerved or nerveless on inner surface, sharp-edged but not wing-margined, rounded and spongy at base, the obliquely cut beak in age bidentulate. Achenes lenticular, closely enveloped. Stigmas 2.

10. *C. Douglasii* Boott. Culms 6-30 cm. high; leaf-blades 1-2.5 mm. wide; staminate spikes linear-elliptic, 8-15 mm. long, 2.5-4 mm. wide; pistillate spikes wider; scales ovate to lanceolate, yellowish-brown, with hyaline margins and lighter center, concealing the perigynia; perigynia lanceolate, strongly nerved, 4 mm. long, 1.75 mm. wide, light brownish; styles elongate. *C. irrasa* Bailey. Dry or alkaline soil: Man.—Ncb.—N.M.—Calif.—B.C. Plain—Mont. My—Au.

11. *C. stenophylla* Wahl. Culms 5-20 cm. high; leaf-blades 1.5 mm. wide at the base, involute above; spikes few, densely aggregated into a head 7-15 mm long; scales broadly ovate, brownish with hyaline margins; perigynia few to a spike, ovate, lightly nerved on both surfaces, 3 mm. long, 1.75 mm. wide, blackish at maturity; styles short. *C. Eleocharis* Bailey. Dry soil: Man.—Iowa—N.M.—Utah—Yukon; Eurasia. Plains—Mont. Je—Jl.

12. *C. simulata* Mackenzie. Culms 3-5 dm. high; leaf-blades 2-4 mm. wide, flat; head 12-25 mm. long, 6-10 mm. wide, the spikes densely aggregated, pistillate, staminate, or androgynous; scales brown with hyaline margins, concealing the perigynia; perigynia 2-25 mm. long, 1.4 mm. wide, round-truncate at base, abruptly beaked, serrulate above. *C. Gayana* N. Am. auth. Wet soil: Mont.—N.M.—Calif.—Wash. Submont.—Mont. My—S.

13. *C. praegracilis* W. Boott. Culms 2-5 dm. high; leaf-blades 1.5-3 mm. wide, flattened or channelled; head linear-oblong to ovate-oblong, 1-5 cm. long, 6-12 mm. wide, the 5-15 spikes densely aggregated, androgynous, with 4-10 perigynia; scales ovate-lanceolate, acute to cuspidate, light brownish, with hyaline margins, nearly concealing the perigynia; perigynia 3-4 mm. long, 1.5 mm. wide, dark brown at maturity, nerved on the outer, nearly nerveless on the inner surface. *C. marcida* Boott. *C. usta* Bailey. *C. alternata* (Bailey) Clarke. *C. camporum* Mackenzie. Meadows, widely distributed and variable: Man.—Iowa—Kans.—Calif.—B.C.; Mex. Prairie—Plains—Submont. My—Au.

14. *C. Sartwellii* Dcwey. Culms 4-7 dm. high, rough above; leaf-blades 2.5-4 mm. wide, flat; head oblong, 3-5 cm. long, about 1 cm. wide, the numerous spikes densely aggregated, the larger with 15-20 perigynia; perigynia lance-ovate, 2.5-4 mm. long, 1.5-2 mm. wide, finely nerved, the beak much shorter than the body. Marshes and bogs: Ont.—N.Y.—Ill.—Colo.—Mont. Plain—Submont.—Boreal. My—Au.

8. *CHORDORRHIZAE* Fries. Culms elongate, prostrate, branching, the rootstocks and roots little developed. Leaf-blades narrow. Spikes 3-10, androgynous, few-flowered, closely aggregated into an ovoid head. Bracts absent or inconspicuous. Perigynia very thick, plano-convex, oblong-ovate, smooth, shining, coriaceous, closely many-nerved, rounded on the margins, rounded and spongy at the base, the short beak obliquely cut. Achenes lenticular, closely enveloped. Stigmas 2.

15. *C. chordorrhiza* Ehrh. Culms 1.5-3 dm. high; head 1-1.5 cm. long; perigynia 4-5 mm. long. Sphagnum bogs: Anticosti—Me.—Ind.—Sask.—Mack.—B.C.; Eurasia. Boreal. My—Jl.

9. *ARENARIAE* Kunth. Rootstocks long-creeping, dark-colored, tough, the culms arising singly or in small clumps at intervals, mostly stiff, dark-tinged at base, aphyllopodic. Leaf-blades narrow. Spikes several to many, more or less closely aggregated, some or all gynaeandrous or staminate, some usually pistillate or androgynous. Lower bract or bracts short-prolonged; the others bract-like. Perigynia appressed-ascending, plano-convex, sharp or wing-margined, at least above, conspicuously rough-beaked, the beak sharply bidentate. Achenes lenticular. Stigmas 2.

16. *C. siccata* Dewey Culms 2-9 dm. high, rough above; leaf-blades 2-3 mm. wide, flat or channeled; head linear-oblong, 2-3.5 cm. long, 5-10 mm. wide, the 6-12 spikes closely aggregated, except the lower 1-3; perigynia few to several, ovate-lanceolate, 5-6 mm. long, 2 mm. wide, much flattened, several-nerved, the beak as long as the body. Dry soil and hills: Me—N.J.—Ariz—Alta. *Boreal—Mont.—Submont. My—Jl.*

10. *MUHLENBERGIANAE* Tuckerm. Densely cespitose or in a few species the rootstocks elongate, tough and dark-colored. Culms not flattened. Opaque part of sheaths neither transversely rugulose nor red-dotted. Spikes usually ten or less, androgynous or pistillate but never gynaeandrous, rarely at all compound. Bracts from little to strongly developed. Perigynia plano-convex, green or chestnut-tinged or light brownish in age, from appressed to reflexed, often strongly spongy at base, nerveless or sparingly nerved, narrowly sharp-margined, conspicuously beaked, the beak sharply bidentate. Achenes lenticular. Style-base more or less thickened. Stigmas 2.

17. *C. Hoodii* Boott. Culms 3-6 dm. high, rough above; leaf-blades 1.5-3.5 mm. wide, flat; head globose or oblong-ovate, 1-2 cm. long, 8-15 mm. wide, the spikes several, with 5-10 ascending perigynia; perigynia lance-ovate, 4-5 mm. long, 1.75-2 mm. wide, obsoletely nerved, margined above, the beak one-third the length of the body. Mountain meadows and slopes. Alta.—Colo.—Calif.—B.C. *Mont.—Submont. Je—Au.*

18. *C. vallicola* Dewey. Culms 2.5-6 dm. high, rough above; leaf-blades about 1 mm. wide, flat or channeled; head 15-20 mm. long, 7 mm. wide; perigynia 1-10, oblong-elliptic, 3.5 mm. long, 2 mm. wide, not nerved, margined above, the short beak minutely serrulate. *C. brevisquama* Mackenzie. Dry slopes: Wyo.—Ore. *Submont. My—Je.*

19. *C. occidentalis* Bailey. Culms 2.5-7.5 dm. high, rough above; leaf-blades flat, channeled, 1.5-2.5 mm. wide; head 1.5-3 cm. long, less than 1 cm. wide; perigynia usually 7-15, lance-ovate, 2.5-3.5 mm. long, 1.75 mm. wide, nerveless, margined above, the serrulate beak one-third the length of the body. Dry places: Wyo.—N.M.—Ariz.—Utah. *Submont.—Subalp. My—Au.*

20. *C. Hookeriana* Dewey Culms 2.5-5 dm. high, rough above; leaf-blades channeled, 1.5-2.5 mm. wide; head 1.5-2 cm. long, about 7 mm. wide; perigynia few, strictly appressed, lanceolate, 4 mm. long, 1.5 mm. wide, nerveless, margined, the serrulate beak half the length of the body. Dry soil: Alta. *Boreal—Submont. Je.*

21. *C. graviora* Bailey. Culms 4-8 dm. high, sharply triangular, rough above, cespitose from short rootstocks; leaf-blades flat, 3-14 mm. wide; head 2-3.5 cm. long, 8-14 mm. wide, ovoid or oblong; perigynia 10-20, dull, ascending, broadly ovate or suborbicular, 3-4 mm. long, 2-3 mm. wide, little-nerved, the beak one-third the length of the body. Prairies and plains: Ill.—Mo.—N.M.—Mont. *Plain—Submont. My—Jl.*

11. *MULTIFLORAE* Kunth. Densely cespitose. Culms sharply triangular. Opaque part of sheaths usually transversely rugulose, red-dotted. Spikes numerous, small, androgynous or pistillate, but never gynaeandrous, the lower more or less compound. Bracts frequently conspicuous. Perigynia plano-convex, not very thick, yellowish or yellowish brown, appressed-ascending or somewhat spreading, not thick-walled, somewhat spongy at base, short-stipitate, sharp-margined, more or less nerved, conspicuously rough-beaked, the beak bidentate. Achenes lenticular. Stigmas 2. Style-base more or less enlarged.

22. *C. vulpinoidea* Michx. Culms 3-9 dm. high, very rough above, exceeding the leaves, leaf-blades long-tapering, 2-5 mm. wide; head 2-12 cm. long, with very many small spikes; pistillate scales strongly awned; perigynia yellowish at maturity, 2-3 mm. long, the beak about the length of the body. Swampy places: N B —Fla —Tex.—Colo.—Ore.—B C. *Plains.* Je—Au.

12 PANICULATAE Kunth. Densely or loosely caespitose. Culms not flattened. Opaque part of sheaths strongly red-dotted. Spikes numerous, small, androgynous or pistillate, but never gynaeceandrous, the lower compound or decompound. Bracts usually inconspicuous. Perigynia thick, strongly convex on the dorsal, and often somewhat convex on the ventral face, brownish or chestnut in age, ascending or spreading, coriaceous, spongy at base, stipitate, narrowly margined, more or less nerved, conspicuously rough-beaked, the beak bidentate. Achenes lenticular. Style-base more or less thickened. Stigmas 2.

23. *C. diandra* Schrank. Culms slender, sharply triangular, loosely caespitose, 3-7 dm. high; leaf-blades 1-25 mm. wide; head 2.5-5 cm. long, somewhat compound; the lower spikes more or less separated; scales acute, brownish, with lighter midvein and hyaline margins; perigynia somewhat biconvex, dark chestnut, shining, nerveless on inner face, spreading at maturity. Wet meadows: N S.—Pa —Colo.—B C —Alaska; Eurasia. *Mont.—Bor.* My—Jl.

24. *C. prairea* Dewey. Culms sharply triangular, 5-10 dm. high; leaf-blades with slightly revolute margins; head 4-8 cm. long, decompound, the lower 3-5 branches separated; scales acute or acuminate, light brown, with broad light-colored center and hyaline margins; perigynia 1-25 mm. wide, nerveless, or lightly nerved on inner face, ascending, plano-convex or nearly so, reddish brown, dull, the beak serrulate. Wet meadows: Que —N J.—Ia —Sask. *Boreal.* My—Jl.

25. *C. cusickii* Mackenzie. Culms sharply triangular, 7-12 dm. high; leaf-blades with slightly revolute margins; head 4-8 cm. long, decompound, the lower branches separated; scales chestnut brown, with lighter midvein and hyaline margins, perigynia 1-5 mm. wide, lightly nerved at base on the inner face, somewhat biconvex, spreading in age, brownish black, dull, the beak setulose-serrulate. *C. teretiuscula* var. *ampla* Bailey. Wet meadows: B.C.—Mont.—Calif. *Submont.* My—S.

13. STENORHYNCHAE Holm. Densely caespitose or with more or less elongated rootstocks. Culms triangular or somewhat flattened. Opaque part of sheaths usually transversely rugulose or red-dotted. Spikes few to many, androgynous to pistillate, but never gynaeceandrous, the lower from simple to compound. Bracts little developed. Perigynia plano-convex, yellowish or yellowish brown, appressed-ascending to spreading, not thick-walled, but strongly spongy at base, stipitate, strongly many-nerved, the margins nearly obsolete on the lower half, conspicuously beaked, the beak bidentate. Achenes lenticular. Style-base more or less thickened. Stigmas 2.

26. *C. Jonesii* Bailey. Culms 2-4 dm. high, slender, very rough above, densely caespitose from elongated rootstocks; leaves clustered near base, the blades 1-2 mm. wide; opaque part of sheath white, not cross-rugulose, truncate at mouth; spikes in a dense ovoid head 8-12 mm. long; scales brown with inconspicuous midvein, exceeding the perigynia; perigynia 3-5 mm. long, the beak nearly smooth. High mountains: Mont —Wyo.—Calif.—Wash. *Submont.—Mont.* Jl—Au.

27. *C. nervina* Bailey. Culms 5-6 dm. high, stout, little roughened above, densely caespitose from short elongated rootstocks, strongly aphyllopodic; leaf-blades clustered on the lower fourth of stem, 3-5 mm. wide; opaque part of sheath olive-tinged, becoming cross-rugulose, rounded at the mouth; spikes in a dense ovoid or oblong head, 15-24 mm. long; scales as in the last; perigynia 4 mm. long, the beak slightly serrulate. High mountains: Wyo.—Calif.—Wash. Jl—Au.

28. *C. stipata* Muhl. Culms 3-10 dm. high, strongly serrulate above, growing in dense clumps; leaf-blades 4-8 mm. wide, the opaque part of sheaths

thin, cross-rugulose; head 2.5–10 cm. long, the lower spikes often separate; scales light-brownish, hyaline-margined; perigynia serrulate. Swamps and wet meadows: Newf.—Fla.—Utah—Calif.—B.C. *Plain—Submont.* My—Au.

14. *STELLULATAE* Kunth. Densely caespitose. Culms triangular. Sheaths not red-dotted or cross-rugulose. Spikes 2–10, or by reduction one, gynaeceandrous, pistillate, or in a few species staminate, not compound. Bracts inconspicuous. Perigynia plano-convex, with orbicular, ovate or broadly oval bodies, green, yellowish brown or brown, spreading or reflexed at maturity, 2.5–3.5 mm. long, strongly spongy at base, sharp-edged nearly, if not entirely, to the rounded or truncate base, not puncticulate, nerved on the outer, nerved or nerveless on the inner surface, the beak bidentate or obliquely cut. Achenes lenticular. Stigmas 2.

29. *C. illota* Bailey. Culms 1–2 dm. high, roughened above; leaf-blades short, 1.5–2 mm. wide; spikes 3–4, forming a dense capitate head 6–8 mm. long; scales broadly ovate, obtuse, brownish black, with light midvein; perigynia ovate, 3 mm. long, brownish black, at length spreading, the beak one-third the length of the body, smooth or nearly so. High mountains: Wyo.—Colo.—Calif.—Wash. *Alp.—Subalp.* Jl—S.

30. *C. laeviculmis* Meinsh. Culms 3–7 dm. high, weak; leaf-blades 1.5–2 mm. wide, flat, soft; spikes 3–8, widely separate or the upper approximate, suborbicular, with 3–10, at length spreading perigynia; scales ovate, hyaline, with conspicuous green midvein; perigynia green or brownish green, ovate, 2.5–3 mm. long, lightly nerved on inner surface, the beak slightly bidentate. *C. Deweyana* var. *sparsiflora* Olney. Wet shaded places: Alaska—Ida.—Calif.; Siberia. *Mont.—Submont.* Je—Au.

31. *C. interior* Bailey. Culms 2–3.5 dm. high, slender and wiry; leaf-blades 1–2 mm. wide; spikes 2–4, the lateral pistillate, subglobose, with 3–10 perigynia, the upper long-tapering and staminate at base; scales half the length of the perigynia, ovate-orbicular, very obtuse, brownish, hyaline-margined all around, the center lighter-colored, the midvein not reaching the tip; perigynia ovate, plump, abruptly beaked, 2.5 mm. long, 1.5 mm. wide, nerveless or obscurely nerved on the inner face, sparingly serrulate on the upper margins. Boggy places: Me.—Fla.—Ariz.—Calif.—B.C.; n Mex. *Plain—Subalp.* My—Au.

32. *C. angustior* Mackenzie. Culms very slender, 1–3 dm. high; leaf-blades 0.5–1.5 mm. wide; spikes 2 or 3, with 3–15 perigynia, the terminal long-clavate; scales as long as the body of perigynia, acute, acuminate or cuspidate, ovate, yellowish brown tinged, with hyaline margins and midvein prominent to tip; perigynia divaricate, 2.5–3.5 mm. long, with raised margins, the beak serrulate. *C. stellulata* var. *angustata* Carey. Boggy places: N.S.—Md.—Colo.—Wash. *Boreal—Submont.* Je.

15. *DEWEYANAE* Tuckerm. Densely caespitose. Culms triangular. Sheaths not red-dotted or cross-rugulose. Spikes 3–8, gynaeceandrous, pistillate or rarely staminate, simple. Lower one or two bracts often conspicuous. Perigynia plano-convex, with narrowly ovate or linear-oblong bodies, light or yellowish green, 3.5–5.5 mm. long, appressed, strongly spongy at base, only upper half sharp-edged, round-tapering at base, nerved on the outer face, nerved or nerveless on the inner face, the beak bidentate to deeply bidentate. Achenes lenticular. Stigmas 2.

33. *C. Deweyana* Schwein. Culms slender, weak, 2.5–9 dm. high, little brownish-tinged at base, strongly roughened beneath head; leaf-blades 2–5 mm. wide; spikes 2–7, ovate-oblong or subglobose, the lower more or less separate, with 3–15 perigynia; lower bract conspicuous; scales white-hyaline, with green midvein, mostly cuspidate; perigynia nerveless on the inner face, shallowly bidentate. Woods: N.S.—Pa.—Ia.—Colo.—Ida.—Mack. *Plain—Submont.* My—Au.

34. *C. leptopoda* Mackenzie. Culms slender, erect, 3–7.5 dm. high, little brownish-tinged at base, roughened beneath head; leaf-blades 2.5–5 mm. wide;

spikes 4-7, ovoid-oblong or linear-oblong, the lower 1-3 separate, with 6-18 perigynia; lower bracts usually shorter than the head; scales not reddish brown tinged, mostly cuspidate; perigynia nerved at base on inner face, shallowly bidentate. Woods: B.C.—Ida.—Calif. *Submont.*—*Mont.* Je-Au.

35. *C. Bolanderi* Olney. Culms slender, erect, 4-9 dm. high, brownish-tinged at the base, little roughened beneath the head; leaf-blades 2.5-5 mm. wide; spikes 4-8, linear-oblong or linear, the lower separate, with 8-20 perigynia; lower bracts usually shorter than the head; scales usually reddish brown tinged, mostly acute or mucronate; perigynia lanceolate, 4-4.5 mm. long, nerved at base on the inner face. Woods: B.C.—Calif.—N.M.—Utah—w. *Mont.* *Submont.*—*Mont.*

16. *OVALES* Kunth. Densely cespitose or (rarely) with short-prolonged rootstocks. Culms triangular. Opaque part of sheaths not red-dotted or cross-rugulose, but sometimes green-striate. Spikes two or three up to twenty, with several to many perigynia, the terminal gynaeceandrous, the lateral pistillate or gynaeceandrous, simple, the inflorescence varying from capitate to moniliform. Lower bracts from inconspicuous to very conspicuous. Perigynia varying from scale-like or flat (except when distended by the achene) to thick and plano-convex, the body subulate to reniform, narrowly to broadly wing-margined, appressed or ascending or spreading, little corky-thickened at base, prominently beaked, the beak bidentate, or obliquely cut becoming bidenticulate, usually serrulate on margins. Style-base scarcely thickened. Achenes lenticular. Stigmas 2.

36. *C. sychnocephala* Carey. Culms 1-6 dm. high, very smooth; leaf-blades 1.5-3 mm. wide; spikes 6-15, densely aggregated into an oblong-ovoid head 1.5-3 cm. long; scales lanceolate, half the length of the perigynia; perigynia 5-6 mm. long, nerved on both faces, the beak deeply bidentate. Meadows and thickets: Ont.—N.Y.—Ida.—*Mont.* *Plains.* Jl-Au.

37. *C. athrostachya* Olney. Culms 1-5 dm. high, roughened above; leaf-blades 2 mm. wide; spikes 4-20, densely aggregated into an ovoid head 1-2 cm. long; scales lance-ovate, somewhat shorter than the perigynia; perigynia 3-4 mm. long, obsoletely nerved, the beak bidentate, reddish brown at mouth. Wet meadows and copses: Sask.—Colo.—Calif.—Alaska. *Mont.*—*Submont.* My-S.

38. *C. tenuirostris* Olney. Culms 6-9 cm. high, nearly smooth; leaf-blades 1.5-2.5 mm. wide; spikes 4-5, densely aggregated, ovoid, 5 mm. long, 3-4 mm. wide; scales ovate, acute, light brownish, with hyaline margins; perigynia 8-13, ascending, 3 mm. long, 1 mm. wide, lanceolate, nerved ventrally, tapering into a beak 1 mm. long. *C. macloviana* f. *involuta* Kükenth. Mountain meadows: *Mont.*—Colo.—Calif.—Wash. *Mont.*—*Submont.* My-Au.

39. *C. adusta* Boott. Culms 2.5-7 dm. high, nearly smooth; leaf-blades 2-3 mm. wide; spikes 3-15, the lower only slightly separate; scales ovate, straw-colored, with greenish midvein; perigynia broadly ovate, 4-5 mm. long, 2-2.5 mm. wide, rather abruptly beaked. *C. pinguis* Bailey. Dry soil: Newf.—N.Y.—Minn.—Sask.—Mack. *Plain.* Je-S.

40. *C. petasata* Dewey. Culms 3-8 dm. high, nearly smooth; leaf-blades 2-3 mm. wide; spikes 3-6, aggregated; scales ovate, reddish brown tinged and hyaline-margined; perigynia broadly lanceolate, 2.25 mm. wide, round-tapering at base, tapering into the beak, which is 2 mm. long. *C. Liddonii* Boott. Meadows and open woods: Sask.—Colo.—Nev.—Wash. *Submont.*—*Mont.* Je-S.

41. *C. aenea* Fernald. Culms 4-9 dm. high, rough beneath the head; leaf-blades 2.5-4 mm. wide; spikes 3-12, 7-24 mm. long, 5-7 mm. thick; scales ovate, light brownish tinged, hyaline-margined; perigynia ascending, ovate, 4 mm. long, 2 mm. wide, rounded at base, tapering into a beak half the length of the body. "*C. foenea* Willd." of our range. Dry places and open woods: Lab.—Conn.—Alta.—B.C.—Yukon. *Boreal.*—*Mont.* My-Jl.

42. *C. Crawfordii* Fernald. Culms 2-6 dm. high, rough beneath the head; leaf-blades 1-3.25 mm. wide; spikes 3-12, 5-11 mm. long, 3-5 mm. wide, rather closely aggregated, well-defined; scales lance-ovate, acute or acuminate, brownish; perigynia erect-ascending, brownish, 4 mm. long, about 1 mm. wide, obscurely

nerved, tapering into a beak half the length of the body. Open places: Newf.—Conn.—Mich.—Ida.—B.C. *Boreal*. Je—S.

43. *C. scoparia* Schkuhr. Culms 2-8 dm. high, rough beneath the head; leaf-blades 1.5-3 mm. wide; spikes 3-10, 6-16 mm. long, 4-6 mm. wide, aggregate or scattered, clearly defined; scales ovate, acute, brownish tinged, perigynia erect-ascending, brownish, usually 5.5-6.5 mm. (occasionally 4-5.5 mm.) long, 1.2-1.9 mm. wide, nerved, tapering into a beak half the length of the body. Moist soil. Newf.—Fla.—Colo.—B.C. *Plain—Submont.* My—Au.

44. *C. Bebbii* Olney. Culms 2-8 dm. high, rough beneath the head; leaf-blades 2-4.5 mm. wide; spikes 5-10, 4-9 mm. long, 3-6 mm. wide; scales ovate, acute, brownish; perigynia ascending, narrowly ovate, 3-4 mm. long, 1.5-2 mm. wide, rounded at base, obscurely nerved, tapering into a beak half the length of the body. Low ground: Newf.—N.J.—Mont.—B.C. *Plain—Submont.* Je—Au.

45. *C. tenera* Dewey. Culms 3-7 dm. high, slender, rough beneath head, spikes 3-8, 4-5 mm. thick; scales acutish, hyaline with green midvein, light brownish tinged; perigynia ascending or spreading, ovate, thick, 3-4 mm. long, 1.5-2.5 mm. wide, rounded at base, nerved, tapering into a beak half the length of the body. *C. straminea* Am. auth., in part. Woodlands. N.B.—Mass.—Ky.—Ark.—Mont.—Canadian Rockies. Apparently rare in our range. *Mont—Boreal.* Je—Au.

46. *C. tinctoria* Fernald. Culms 6-10 dm. high, rough beneath head; spikes 4-12, 6-9 mm. long, 5-8 mm. thick; scales ovate, acutish, reddish brownish with light midvein; perigynia 10-30, appressed, ovate, thick, 3.75-4.5 mm. long, 1.5-2 mm. wide, rounded at base, nerved, tapering into a beak less than half the length of the body. Woodlands: Que.—Me.—N.Y.—Mich.—Alta. *Boreal—Plain* My—Jl.

47. *C. brevior* (Dewey) Mackenzie. Culms 3-12 dm. high, rough beneath head; leaf-blades 2-4 mm. wide; spikes 3-10, oblong to globose, 4-9 mm. wide, 7-15 mm. long, aggregate or separate; scales acute; perigynia ovate to orbicular, thick, 4-5.5 mm. long, 2.5-3.5 mm. wide, spreading or ascending, faintly nerved on inner face, the beak about one-third the length of the body. *C. festuacea* authors, in part. Dry soil: N.B.—Fla.—Tex.—N.M.—B.C. *Plain—Submont* Ap—Au.

48. *C. Egglestonii* Mackenzie. Culms 4-9 dm. high, roughened beneath head, leaf-blades 2.5 mm. wide; spikes 3-6, closely aggregate, broadly ovoid, 10-14 mm. long, 6-10 mm. wide; scales ovate, acute, hyaline-margined; perigynia numerous, appressed-ascending, ovate, olive-green or brownish in age, 6-7 mm. long, 3 mm. wide, thin, obscurely nerved on inner face, strongly winged, rounded at the base, the beak one-third the length of the body. "*Carex stramineiformis* Bailey" auth., in part. Dry soil: Wyo.—Colo.—Utah. *Mont.—Subalp.* Jl—Au.

49. *C. phaeocephala* Piper. Culms 1-3 dm. high, rough beneath head; leaves bunched at the base, the blades more or less involute, 1.5-2 mm. wide; spikes 2-5 (rarely 7), aggregate, 6-12 mm. long, 5-8 mm. wide; scales strongly hyaline-margined, acute; perigynia ascending, oblong-ovate, 1.8 mm. wide, round-tapering at the base, obscurely nerved on inner face, contracted into a beak about 1 mm. long. "*C. Preslii* Steud." Bailey. "*C. petasata* Dewey" Holm. *C. leporina* v. *americana* Olney. Mountain summits: Alta—Colo.—Calif.—B.C. *Alp.—Mont.* Jl—S.

50. *C. xerantica* Bailey. Culms 3-6 dm. high, nearly smooth, leaf-blades 2-3 mm. wide; spikes 3-6, approximate but distinct, ellipsoid, 8-14 mm. long, 5 mm. wide; scales silvery-hyaline, darker tinged; perigynia 4-5.5 mm. long, 2-2.5 mm. wide, nearly nerveless on inner face, round-tapering at the base, tapering into a beak one-third the length of the body. Prairies and plains: Man.—Sask.—Colo.—Kans. *Plains.* Jl.

51. *C. praticola* Rydb. Culms slender, 2.5-6 dm. high, roughened beneath the head; leaf-blades 1-2 mm. wide; spikes 2-6, elliptic, 6-16 mm. long, 5 mm. wide; scales somewhat brownish-tinged, shining; perigynia appressed, ovate-

lanceolate, 4.5-6.5 mm. long, narrowly winged, round-tapering at the base, nearly nerveless on inner face, tapering to a short hyaline-tipped beak. *C. pratensis* Drejer Meadows and open woods: Greenl.—Me.—Colo.—Calif.—Alaska. *Submont.*—*Mont.*—*Boreal.* Je—Au.

52. *C. Piperi* Mackenzie. Culms slender, 3-8 dm. high, roughened beneath head, leaf-blades 2-3.5 mm. wide; spikes 3-9, elliptic, 10-18 mm. long, 5-6 mm. wide; scales ovate, chestnut-brown with lighter center and narrow hyaline margins, shining; perigynia 8-15, appressed, ovate-lanceolate, 4-5 mm. long, 1.75 mm. wide, narrowly winged, round-tapering at base, nearly nerveless on inner face, contracted into the hyaline-tipped beak, 1.5 mm. long. *C. furva* (Bailey) Howell Damp meadows: Alta.—Wyo.—Ore.—B.C. *Submont.*—*Mont.* Je—Au.

53. *C. microptera* Mackenzie. Culms 3-10 dm. high, smooth or roughened beneath the head; leaf-blades 2-6 mm. wide; spikes 5-20, densely aggregate into a subglobose to oblong-ovoid head, the spikes ovoid, 5-8 mm. long, 4-6 mm. wide; scales ovate-lanceolate, sharp-pointed, brown with light midvein; perigynia ascending, 15-30, 3.5-4.5 mm. long, 1-1.5 mm. wide, lanceolate, nerved ventrally, very narrowly winged, tapering into a beak one-third the length of the whole. Mountains: Alta.—Wyo.—Ore.—Wash. *Submont.*—*Mont.* Je—Au.

54. *C. festivella* Mackenzie. Culms rather stout, 2-7 dm. high, roughened above; leaf-blades 2.5-4 mm. wide; spikes 3-8, densely aggregate, ovoid-orbicular, 5-9 mm. long, 4-8 mm. wide, scales ovate, dark reddish brown with narrow hyaline margins; perigynia numerous, appressed, 3.5-5 mm. long, 1.75-2.75 mm. wide, ovate, lightly nerved on the inner face, rounded at the base, narrowed into a beak one-third the length of the body. *C. festiva* authors, as to Rocky Mt. plant Meadows and mountain sides: Alta.—N.M.—Ariz.—Nev.—B.C. *Submont.*—*Mont.* Je—Au.

55. *C. nubicola* Mackenzie. Culms 12-35 cm. high, nearly smooth; leaf-blades 2-3 mm. wide; spikes 4-7, densely aggregate, ovoid or subglobose, 5-9 mm. long, 4.5-8 mm. wide; scales ovate, acute, blackish with a light center and nearly obsolete hyaline margins; perigynia 15-30, 4.5-5 mm. long, 2-2.75 mm. wide, ovate, rounded at the base, abruptly beaked, the beak half the length of the body. *C. Hayleniana* Olney. *C. festiva* var. *decumbens* Holm. Mountain sides: Alta.—Colo.—Nev.—Ore. *Mont.*—*Alp.* JI-S

56. *C. ebenea* Rydb. Culms 2-5 dm. high, little roughened; leaf-blades 2-3 mm. wide; spikes 5-10, densely aggregate, ovoid-oblong, 7-12 mm. long, 6 mm. wide; scales lance-ovate, acute, brownish black with nearly obsolete hyaline margins; perigynia appressed, numerous, 5-7 mm. long, 1.75 mm. wide, lanceolate, round-tapering at the base, narrowed into a beak about 2 mm. long. Mountain meadows. Wyo.—N.M.—Ariz.—Utah. *Mont.*—*Alp.* Je—Au.

57. *C. pachystachya* Cham. Culms rather slender, 3-8 dm. high, nearly smooth; leaf-blades 2-4 mm. wide; spikes 4-8, densely aggregate, ovoid or subglobose, 5-8 mm. long, 4-6 mm. wide; scales ovate, reddish, with very narrow hyaline margins; perigynia 10-30, 3.5-4 mm. long, 1.5-2.25 mm. wide, ovate, nerveless on the inner face, rounded at base, contracted into a beak half the length of the body. Mountains: Alaska—Alta.—Colo.—Ore. *Submont.*—*Mont.* My—Au.

58. *C. Preslii* Steud. Culms 2.5-7.5 dm. high, rough beneath head; leaf-blades 1.5-4 mm. wide; spikes 3-8, well-defined, aggregate or the lower separate, 5-8 mm. long, slightly narrower, rounded at apex, rounded at the base, the terminal one tapering; scales ovate, reddish brown with green midvein and narrow margins; perigynia 10-25, ovate, thick, 3.5 mm. long, 2 mm. wide, obscurely nerved, rounded at base, abruptly beaked, the beak 1 mm. long. *C. festiva* var. *gracilis* Olney. *C. mukimoda* Bailey. Mountains: B.C.—Mont.—Calif. *Mont.*—*Subalp.* My—S.

17. CANESCENTES Fries Cespitose, but in some species with slender stolons. Culms triangular. Sheaths not cross-rugulose. Spikes 1-10, with few to many perigynia, the terminal gynaecandrous, the lateral pistillate or gynaecandrous,

simple. Bracts inconspicuous. Perigynia plano-convex, white-punctulate, lanceolate, ovate, oval, or obovoid, appressed to spreading, beakless to prominently beaked, more or less nerved on both sides, not winged or margined, but acute-edged above, nearly or entirely filled by the lenticular achene. Style-base not enlarged. Stigmas 2.

59. *C. disperma* Dewey. Culms weak, 1.5-6 dm. high, in large clumps, but with slender rootstocks; leaf-blades 1-1.5 mm. wide; spikes distant or the upper aggregate, 1-5-flowered; perigynia ovoid-elliptic, 2 mm. long, 1.5 mm. wide, finely nerved, the minute beak smooth. *C. tenella* Schk. Bogs: Newf.—N.J.—Ind.—N.M.—Calif.—B.C.—Alaska; Eurasia. *Submont.*—*Subalp.* Je—Au.

60. *C. trisperma* Dewey. Culms filiform, weak, 1.5-8 dm. long, in large clumps, but with slender rootstocks; leaf-blades 1-2 mm. wide; perigynia oblong, 2.5-4 mm. long, nearly 2 mm. wide, finely nerved, narrowed at the apex, the minute beak smooth or nearly so. Swamps and wet woods: Lab.—Md.—(?Neb.)—Sask. *Boreal.* Je—S.

61. *C. tenuiflora* Wahl. Culms slender, weak, 2-6 dm. long, loosely caespitose and stoloniferous; leaf-blades 0.5-2 mm. wide; perigynia oblong-obovoid, 2.5-3.5 mm. long, 1.5 mm. wide, obscurely nerved. Bogs: N.B.—Me.—Minn.—Alta.; Eurasia. *Boreal.* Je—Au.

62. *C. Lachenalii* Schkuhr. Culms stiff, erect, 0.7-4 dm. high; leaf-blades 1-3 mm. wide; spikes 2-6, many-flowered; perigynia 2-3.5 mm. long, several-nerved, abruptly short-beaked. *C. lagopina* Wahl. Greenl.—Canadian Rockies—Alaska; Eurasia. *Arctic.* Jl—Au.

63. *C. Heleonastes* Ehrh. Culms stiff, erect, 1-4.5 dm. high; leaf-blades 1-2 mm. wide; spikes 2-5, with 5-10 perigynia; the latter 3 mm. long, 1.25 mm. wide, several-nerved, tapering into the short beak. Bogs: Ont.—Alta.—B.C.—Mack.; Eurasia. *Subalp.*—*Boreal.* Jl—Au.

64. *C. canescens* L. In large clumps, the culms slender, 2.5-8 dm. high; spikes 4-9, 3-12 mm. long, 3-5 mm. wide; perigynia 1.8-2.8 mm. long, 1-1.8 mm. wide, faintly few-nerved. Swamps and bogs: Lab.—Va.—Calif.—Alaska; Eurasia; S. Am.; Australia. *Submont.*—*Subalp.* My—Au.

65. *C. brunnescens* (Pers.) Poir. Culms slender, 2-5 dm. high; spikes 4-8, 4-10-flowered, subglobose, 4-13 mm. in diameter; perigynia mostly smaller than in the preceding species. In wet places, banks and open woods: Lab.—N.C.—Colo.—Wash.—Alaska; Eurasia. *Submont.*—*Subalp.* Je—Au.

66. *C. arcta* Boott. Culms slender, erect, 1.5-8 dm. high; leaf-blades 2-4 mm. wide; spikes 5-15, many-flowered, aggregate into a head 1.5-3 cm. long; perigynia ascending or somewhat spreading, 2-3 mm. long, many-nerved. *C. canescens* var. *oregana* Bailey. Swamps and wet woods: N.B.—N.Y.—Mont.—Calif.—B.C. *Submont.* Je—Au.

18. PHYLLOSTACHYAE Tuckerm. Culms densely caespitose, weak, compressed, dilated below the spikes, mostly much exceeded by the leaves. Spikes 2-4, androgynous, the rachis zigzag, dilated; one spike terminal, the others basal on often much elongated peduncles; staminate portion with small tight scales; pistillate portion loosely one-several-flowered, the scales elongated and conspicuous. Perigynia glabrous, 2-keeled, but otherwise nerveless, nearly round in cross-section, more or less beaked, the beak flattened-triangular, the orifice hyaline. Achenes triangular, stipitate, the sides convex, filling the perigynia, the apex rounded. Stigmas 3, short. Style jointed at the base with achene, soon withering.

67. *C. durifolia* Bailey. Culms up to 2.5 dm. long; leaf-blades green, not glaucous, 1.5-3 dm. long, 2.5-6 mm. wide; lower pistillate scales as in the next; perigynia 5-6 mm. long, the body oval, the beak smooth, about as long as the body. *C. Backii* Boott. Woods: Que.—Mass.—N.Y.—Alta.—e B.C.

68. *C. saximontana* Mackenzie. Culms up to 1.5 dm. long; leaf-blades glaucous, 1.5-3 dm. long, 3-5 mm. wide; lower pistillate scales leaf-like, saccate; perigynia 4 mm. long, the body oblong-globose, the beak barely 1 mm. long,

the margins weakly serrulate. "*C. Backii* Boott" Fl. Colo. Woods and thickets: Colo.—Wyo.—w Neb. *Submont.* Jl.

19. **POLYTRICHOIDEAE** Tuckerm. Densely tufted. Culms slender. Leaf-blades narrow. Spike solitary, linear, androgynous, bractless. Rachis straight, not dilated. Perigynia appressed, membranaceous, the upper part empty, oblong-elliptic, many-nerved (not 2-ribbed), compressed-triangular, beakless. Achenes triangular. Style slender, flexuous, its base not enlarged. Stigmas 3, short.

69. *C. leptalea* Wahl. Rootstocks elongated; culms 2-6 dm. high, obscurely triangular; leaf-blades 0.5-1.25 mm. wide; spike 4-15 mm. long, 2-3 mm. wide; perigynia 1-10, 2.5-4.25 mm. long, not concealed by scales. *C. polytrichoides* Willd. Bogs and wet meadows: Lab.—Fla.—Tex.—Colo.—Calif.—Alaska. *Plavn—Mont.* Je—Jl.

20. **OBTUSATAE** Mackenzie. Rootstocks long, creeping. Culms low, slender. Leaf-blades involute. Spike solitary, linear, androgynous, bractless. Perigynia appressed-ascending, ovoid, glabrous, many-nerved, coriaceous, shining, substipitate, obscurely triangular, the beak hyaline-tipped, obliquely cut, at length bidentate. Achenes triangular. Stigmas 3.

70. *C. obtusata* Liljeb. Culms 6-20 cm. high, rough above; sheaths sparingly filamentose; leaf-blades 1-1.5 mm. wide; spike 5-12 mm. long, 3-6 mm. wide, the upper two-thirds staminate; perigynia 1-6, impressed nerved, 3-4 mm. long, exceeding the scales. Dry hills and ridges: Mont.—Colo.—B.C.; Eurasia. *Mont.—Subalp.* Je—Au.

21. **NITIDAE** O. F. Lang. Culms slender, leafy at the base. Leaf-blades narrow. Terminal spike linear, staminate. Lateral spikes 1-3, small, pistillate, subglobose to oblong, few-many-flowered, sessile or short-peduncled. Lowest bract squamiform, sheathless or sub-sheathing. Scales reddish brown with hyaline margins. Perigynia ovoid, turgid-triangular, smooth, shining, coriaceous, round-tapering at the base, tipped with the short, cylindric, hyaline-tipped, obliquely cut beak. Achenes sessile, triangular, closely enveloped, short apiculate. Style short, jointed with the apex of achene, thickish. Stigmas 3, long.

71. *C. supina* Wahl. Long-stoloniferous; culms 6-25 cm. high; leaf-blades 1-1.5 mm. wide; pistillate spikes 1-2, sessile, 4-10-flowered, 4-8 mm. long, subglobose or short-oblong; perigynia nerveless (except keels), 2.5-3.5 mm. long. Dry soil: Greenl.—Mack., reported from Minn. and Sask.; Eurasia. *Boreal—Arctic.* My—Jl.

22. **RUPESTRES** Tuckerm. Stoloniferous. Culms low. Leaf-blades narrow, flattened. Spikes 1 and androgynous, or 2-4, with the terminal staminate and linear, the lateral pistillate, approximate or more or less separate, few-flowered, sessile or short-peduncled. Bracts of the pistillate spike leaflet-like, sheathless or nearly so. Pistillate scales dark chestnut to purplish brown, with hyaline margins. Perigynia appressed-ascending, obovoid, glabrous, membranous, not polished, rounded and sessile at base, 2-ridged, obscurely triangular in cross-section, abruptly contracted into a hyaline-tipped, obliquely cut, straight beak. Achenes closely enveloped, triangular, with concave sides, apiculate. Style-base thickened. Stigmas 3.

72. *C. rupestris* All. Culms 7-10 cm. high, sharply triangular, rough; sheaths not filamentose; leaf-blades 2-3 mm. wide; spike 1-1.5 cm. long, 3-6 mm. wide, the upper half staminate; perigynia 6-15, finely many-nerved, 4 mm. long, concealed by the scales. Arctic-alpine situations: Greenl.—Que.—Colo.—Alta.—Alaska; Eurasia. *Alp.—Subalp.* Je—Au.

23. **FIRMICULMES** Kükenth. Culms wiry, triangular, aphyllopodic, the leaf-blades rudimentary at flowering time. Spike 1, androgynous, the staminate part in age short-peduncled, the pistillate loosely flowered; bracts absent; scales more or less chartaceous; perigynia 1 to several, obtusely triangular, smooth,

2-keeled but otherwise nerveless, tapering at the base, very minutely beaked, the orifice truncate. Achenes triangular, with nearly flat sides, closely enveloped by the perigynia, tipped by the minute persistent base of the style, constricted at base. Stigmas 3, elongated

73. *C. Geyeri* Boott. Rootstock woody, elongated; culms up to 3.5 dm high, very rough; leaf-blades thick, 2-3.5 mm. wide, those of the culm developing after flowering; perigynia 1-3, 6 mm. long. Dry mountain sides and open woods: Alta.—Colo.—Utah—Ore.—Wash. *Submont.*—*Subalp.* My—Au.

24. *FILIFOLIAE* Tuckerm. Densely caespitose. Leaf-blades filiform or narrow. Spike solitary, linear or linear-oblong, androgynous, densely flowered, bractless. Perigynia more or less triangular, nerveless except for the two lateral ribs, not stipitate, puberulent or pubescent, the hyaline-tipped beak obliquely cut. Achenes triangular. Stigmas 3

74. *C. elynoides* Holm. Culms 8-12 cm. high; spike 8-15 mm. long, with 4-8 ascending perigynia; pistillate scales with dingy white hyaline margins; perigynia 2.5-3 mm long, slightly puberulent above, slenderly beaked. *C. filifolia* var. *miseria* Bailey. Mountain summits: Mont.—Colo.—Nev. *Alp.* Je—Au.

75. *C. filifolia* Nutt. Culms 8-30 cm. high; spike 1-2 cm. long, with 5-10 perigynia; pistillate scales with broad bright white hyaline margins; perigynia 3 mm. long, puberulent, abruptly and minutely stout-beaked. Plains and ridges: Sask.—Tex.—N.M.—Wash.—Yukon. *Plains*—*Mont.* Ap—Jl.

76. *C. oreocharis* Holm. Culms 1-2 dm. high; spike 1-2 cm. long, with 3-7 perigynia; pistillate scales ovate, acuminate; perigynia 4 mm long, broadly obovoid, minutely pubescent, abruptly short-beaked. *C. filifolia* var. *valida* Bailey. Dry slopes: Colo. *Submont.* Je.

25. *SCIRPINAE* Tuckerm. Rootstocks creeping. Culms leafy below. Leaf-blades narrow. Spike usually 1, linear, staminate or pistillate, many-flowered, occasionally with an additional spike and normally with an empty scarcely sheathing squamiform bract a short distance below the spike. Perigynia triangular or flattened-triangular, membranous, 2-keeled, pubescent or puberulent, tapering at the base, contracted at apex into the short cylindric entire or bidenticulate beak. Achenes triangular, with flat sides, sessile. Style slender, slightly enlarged at the base, not jointed. Stigmas 3, short

77. *C. pseudoscirpoidea* Rydb. Rootstocks stout; culms 1-3 cm. high; leaf-blades 2-3 mm. wide; spike 12-36 mm. long, 2-5 mm. wide; scales brownish black; perigynia obovoid, strongly pubescent, triangular, 2.5 mm. long, with bidenticulate beak. Mountain sides: Mont.—Colo.—Utah. *Mont.*—*Subalp.* Jl—Au.

78. *C. stenochlaena* (Holm) Mackenzie. Rootstocks stout, densely matted; culms 2.5-4 dm high; leaf-blades 2-2.5 mm. wide; pistillate spikes 1.5-3 cm long, 4-7 mm. wide; scales oblong-ovate, blackish, with narrow hyaline margins, ciliate; perigynia blackish at the apex. Mountains: Alaska—Alta.—Ida.—Wash. *Submont.*—*Mont.* Jl—S.

79. *C. scirpoidea* Michx. Rootstocks stoutish; culms 2-3.5 dm. high; leaf-blades 1-2 mm. wide; pistillate spikes 1.5-3 cm. long, 2.5-5 mm. wide; scales ovate, chocolate-brown, ciliate and puberulent; perigynia 3 mm. long, not blackish. Arctic-alpine, along streams: Greenl.—N.H.—N.Y.—Mich.—Mont.—B.C.—Alaska; Eurasia, where rare. *Alp.*—*Subalp.* Je—Au.

80. *C. scirpiformis* Mackenzie. Rootstocks stoutish; culms 2.5-4.5 dm. high; leaf-blades 2-3 mm. wide; pistillate spikes 2-4 cm. long, 4-5 mm. wide; scales ovate, brownish, strongly pubescent and ciliate at the apex; perigynia 2.5 mm. long, not blackish. Mountains: Alta.—N.D. *Mont.* Jl.

26. *MONTANAE* Fries. Culms slender, leafy at the base. Leaf-blades narrow, rough above. Terminal spike linear, normally staminate. Lateral spikes 1-5, small, pistillate, or sometimes androgynous, subglobose to oblong, closely few-many-flowered, approximate and sessile or short-peduncled, or in some

species radical and long-peduncled. Lowest bract squamiform or leaflet-like, sheathless or sub-sheathing. Scales often reddish brown tinged, acute to cuspidate. Perigynia membranaceous, ascending, the body pubescent, at least at the base of the beak, obovoid to elliptic, triangular, 2-keeled, strongly stipitate at the base, abruptly contracted into a cylindric or terete, emarginate to deeply bidentate beak, hyaline-tipped. Achenes normally triangular, the sides concave, closely enveloped, short-apiculate. Style short, jointed with apex of achene, thickish. Stigmas normally 3, long.

81. *C. heliophila* Mackenzic. Culms 12-25 cm. high; leaf-blades 1-2 mm. wide; lowest bract squamiform; pistillate spikes 1-2 (rarely 3), subglobose, 5-15-flowered; perigynia 3.5 mm. long, 2 mm. wide, orbicular in cross-section, the beak deeply bidentate, in age strongly hyaline-tipped. "*C. pennsylvanica respertina* Bailey," Fl. Colo. Prairies and plains: Man.—Ill.—Mo.—N.M.—Colo. Plains—Submont. Jc-S.

82. *C. Peckii* E. C. Howe. Loosely caespitose, the culms 1.25-6 dm. high; leaf-blades 3 mm. wide or less; lowest bract short; staminate spike sessile, 3 mm. long or less; pistillate spikes 2-4, subglobose, 2-8-flowered, closely contiguous or the lower a little separate; perigynia oblong-obovoid, 3-4 mm. long, 1 mm. wide, grayish-pubescent, the beak one-fourth the length of the body; scales (except lower) half the length of the perigynia, reddish brown, with broad white hyaline margins. "*C. albicans* Willd." authors. Open woods: Que.—Mass.—N.Y.—Mich.—(Black Hills) S.D.—Alaska.

83. *C. umbellata* Schkuhr. Densely caespitose; culms up to 1.5 dm. high, much exceeded by leaves; leaf-blades 1.5-3 mm. wide; non-basal pistillate spike usually present, oblong, globose; basal spike oblong; perigynia 2.25-3.25 mm. long, 1.25 mm. wide, rounded-triangular in cross-section, the beak obscurely bidentate, less than half the length of the body; achenes light brown. *C. umbellata* var. *brevirostris* Boott. Dry sunny places: Que.—Dcl.—Alta.—B.C. Plains—Submont. Ap-Jl

84. *C. deflexa* Hornem. Loosely stoloniferous; culms very slender, 2-12 cm. high; leaf-blades 1-2 mm. wide; staminate spike inconspicuous, 2-4 mm. long, 0.5-1 mm. wide; pistillate spikes subglobose, 2-8-flowered; perigynia 1 mm. wide, nearly orbicular in cross-section. Dry soil: Greenl.—N.Y.—Mich.—Sask.—B.C.—Alaska. Boreal. My-Au.

85. *C. Rossii* Boott. Rootstock stout; culms wiry, 5-25 cm. high; leaf-blades 1-2.5 mm. wide; staminate spike usually conspicuous, 3-10 mm. long, 1 mm. wide; pistillate spikes globose to short-oblong, 2-12-flowered; perigynia up to 3.4 mm. long, 1.25 mm. wide, nearly orbicular in cross-section. Dry soil: Mich.—Colo.—Calif.—B.C. Submont.—Subalp. Ap-Au.

27. DIGITATAE Fries. Culms slender, leafy at the base. Leaf-blades narrow, the sheaths usually strongly purplish. Terminal spike linear, staminate. Lateral spikes 1-5, approximate, or separated or sometimes radical, oblong to linear, 5-20-flowered in few rows, the peduncles included or exerted. Bracts sheathing, more or less strongly purplish tinged, subspathaceous, the blade absent or rudimentary. Pistillate scales strongly purplish or reddish brown tinged. Perigynia membranaceous, appressed, oblong-obovoid, pubescent to glabrate, triangular, long-tapering into the stipitate base, abruptly contracted into the minute beak, the orifice entire or nearly so. Achenes triangular, closely enveloped. Style-base short, thickened, jointed with the apex of the achene. Stigmas 3, early deciduous.

86. *C. pedunculata* Muhl. Densely matted, rather bright green; culms slender, diffuse, strongly purple tinged at the base, 0.7-3 dm. long; leaf-blades 2-3 mm. wide, terminal spike long-stalked, usually pistillate at the base; lateral spikes few-flowered, filiform-stalked, spreading or drooping, scattered, some appearing basal; perigynia sharply 3-angled, puberulent or in age glabrate, stipitate, tipped with a minute entire beak; scales obovate, purplish, with green midrib, abruptly cuspidate. Dry woods: Anticosti—Va.—Ia.—e B.C. My-Jl.

87. *C. concinna* R. Br. Strongly stoloniferous; culms 5-15 cm. high; leaf-blades 2-2.5 mm. wide; pistillate spikes 2-3, rather closely 4-10-flowered; scales broadly ovate, hyaline-margined; perigynia densely pubescent, 3 mm. long, nerveless. Dry soil: Que.—Sask.—Colo.—B.C.—Alaska. *Mont.—Boreal.* Je-Jl.

88. *C. concinnoides* Mackenzie. Strongly stoloniferous; culms 25 cm. high or less; leaf-blades 2-4 mm. wide; pistillate spikes 1 or 2, approximate, rather closely 5-10-flowered; scales narrowly ovate, hyaline-margined; perigynia 2.5-3 mm. long. Dry soil: B.C.—Alta.—Mont.—Ida.—Calif. *Mont.* My-Jl.

89. *C. Richardsonii* R. Br. Strongly stoloniferous; culms 30 cm. high or less; leaf-blades 2-4 mm. wide; pistillate spikes 2 or 3, approximate or the lowest remote, rather closely 8-20-flowered; scales strongly hyaline-margined; perigynia 2.5-3 mm. long. Dry soil: Ont.—N.Y.—Ill.—S.D.—Sask. *Mont.—Boreal.* My-Je.

28. *ALBAE* Aschers. & Graebner. With long slender stolons. Culms very slender, obtusely triangular, leafy near the base. Leaf-blades of the fertile culm very narrow, involute. Terminal spike linear, staminate. Lateral spikes 2-3, oblong or linear, loosely 4-8-flowered, all long-peduncled, linear or oblong, often overtopping the staminate one. Bracts sheathing, subspathaceous, bladeless, white-hyaline above. Scales white-hyaline, yellowish tinged. Perigynia erect, obovoid, triangular, glabrous, nerved, tapering at the base, abruptly minutely beaked, the orifice entire, hyaline. Achenes triangular, closely enveloped, the sides concave. Style-bascul very short, bulbous-thickened, jointed with the achene. Stigmas 3, long.

90. *C. oburnea* Boott. Culms 1-3.5 dm. high; leaf-blades 0.5 mm. wide or less; staminate spike sessile, 3-8 mm. long; perigynia membranaceous, obsoletely nerved, 2 mm. long, exceeding the scales. Dry sandy or rocky soil, especially limestone rocks: N.B.—Va.—Tenn.—Neb.—B.C.—Mack. *Plain—Mont.; Boreal.* My-Au.

29. *BICOLORS* Tuckerm. Stoloniferous. Culms central, slender, leafy towards the base. Leaf-blades narrow. Basal sheaths light brown. Terminal spike linear, staminate or occasionally gynaeandrous. Lateral spikes 2-5, pistillate, rather closely few-many-flowered in few ranks on erect exserted peduncles. Bracts sheathing, not colored or dark-aureicled, the blades elongated, leaf-like. Scales reddish or purplish brown tinged. Perigynia ascending, broadly oval or ellipsoid, circular in cross-section, nerved, glabrous, golden-yellow or white-pulverulent at maturity, tapering or rounded at the base, essentially beakless. Achenes lenticular, apiculate, closely enveloped. Style-base slender, short, jointed with the achene. Stigmas 2.

91. *C. Hasselii* Bailey. Culms 1.5-6 dm. high; leaf-blades 2-4 mm. wide; pistillate spikes 6-20-flowered; scales usually purplish brown tinged; perigynia 2.5-3 mm. long, slightly pointed, less than 2 mm. wide; style becoming short-exserted and somewhat persistent. River banks and wet rocks: Lab.—Me.—Pa.—Alta.—Utah—Calif.—Yukon. *Boreal—Submont.—Son.*

92. *C. aurea* Nutt. Culms 0.3-4 dm. high; leaf-blades 2-4 mm. wide; pistillate spikes 4-20-flowered; scales usually reddish brown tinged; perigynia subumbonate, 2 mm. wide; style not exserted or persistent. Wet places: Newf.—Conn.—Mich.—N.M.—Calif.—B.C. *Plain—Subalp.* Je-Jl.

30. *PANICEAE* Tuckerm. Stoloniferous. Culms central, slender, leafy towards the base. Basal sheaths brownish or purplish tinged. Terminal spike staminate, linear or linear-oblong. Lateral spikes 1-5, pistillate, loosely to rather closely several-many-flowered, in few or several ranks, on erect, exserted or included peduncles. Bracts sheathing, not colored or dark-aureicled, the blades developed. Scales purplish or reddish brown tinged. Perigynia ascending or spreading, ovoid or obovoid, membranaceous, obtusely triangular, slightly inflated, glabrous, puncticulate, light or olive green, pointed or beaked, the orifice entire or nearly so. Achenes triangular. Style-base slender, continuous with achene. Stigmas 3.

93. *C. livida* (Wahl.) Willd. Culms 1.5-5 dm. high; leaf-blades 2 mm. wide or less; pistillate spikes closely 5-15-flowered; perigynia 3.75 mm. long, 1.75 mm. wide, faintly nerved, narrowed above, exceeding the scales. Sphagnum bogs: Lab.—N.J.—Mich.—Calif.—B.C.—Alaska. *Boreal*. My-Jl.

94. *C. tetanica* Schk. Rootstocks elongate, deep-seated, slender; culms 1.5-6 dm. high, slender; culm-leaves usually 3-5, 2-3.5 mm. wide; staminate spike long-stalked; pistillate spikes 1-3, linear, 6-20-flowered, distant, erect or the lower filiform-stalked and drooping; perigynia 3 mm. long, 2 mm. wide, obtusely triangular, prominently many-nerved, abruptly minutely beaked; scales usually shorter than the perigynia, obtuse or mucronate. Meadows and wet woods: Mass.—D. C.—Mo.—Sask. *Plain*.

95. *C. Meadli* Dewey. Resembling the last, but stouter; culms 2-5 dm. high; culm-leaves usually 6-10, 3-7 mm. wide; staminate spike long-stalked; pistillate spikes 1-3, oblong, densely 8-30-flowered, distant, erect, the lower long-stalked; perigynia more than 3 mm. long, 2 mm. wide, obtusely triangular, prominently many-nerved, tipped with a minute slightly bent beak; scales obtuse to cuspidate. Meadows and prairies: N.J.—Ga.—Neb.—Sask. *Plain*.

96. *C. vaginata* Tausch. Culms 1.5-8 dm. high, weak; leaf-blades 2-5 mm. wide; pistillate spikes loosely 3-20-flowered; perigynia 4 mm. long, nearly 2 mm. wide, faintly nerved, the orifice purplish tinged, 2-toothed; scales purplish tinged, exceeded by the perigynia. Boggy woods: Lab.—N.Y.—Minn.—B.C.—Alaska. *Mont.*—*Boreal*. Je—Au.

31. LAXIFLORAE Kunth. Cespitose. Fertile culms mostly lateral, the sterile shoots leafy, conspicuous. Basal sheaths brownish- or purplish-tinged. Terminal spike staminate, linear. Lateral spikes 2-5, pistillate or androgynous, loosely to closely few-many-flowered, in few-several ranks, on erect to drooping, included or exerted peduncles. Bracts sheathing, the sheaths green or purplish-tinged, the blades leaf-like or sometimes reduced. Scales green with hyaline margins or more or less colored. Perigynia ascending, membranaceous, triangular, usually nerved, closely enveloping the achene, glabrous or hispidulous, tapering at the base, short-beaked or beakless, the orifice entire. Achenes triangular. Style-base slender, continuous with the achene. Stigmas 3.

97. *C. blanda* Dewey. Culms 1.5-6 dm. high, pale green, brownish at base; sterile shoots developing conspicuous culms; leaf-blades 3-14 mm. wide, the sheaths with much crisped margins; staminate spike short-stalked or sessile, the scales rarely reddish brown tinged; pistillate spikes 2-4, oblong or linear-oblong, rather closely 8-25-flowered, the upper two contiguous, sessile or nearly so, the lower distant and stalked; perigynia obovoid, 2.5-3 mm. long, strongly nerved, contracted into a short, stout, outwardly bent beak; scales with broad white scarious margins, the lower strongly awned. Me.—Va.—Ark.—w S.D. *Plain*. My-Jl.

32. GRANULARES Bailey. Culms central, slender, leafy. Leaf-blades flat. Basal sheaths brownish. Terminal spike staminate, linear. Lateral spikes 2-4, pistillate, closely many-flowered in several ranks, erect, on more or less strongly exerted peduncles. Bracts sheathing, not colored or dark-auricled, the blades leaf-like. Scales ovate, pointed, slightly ferruginous. Perigynia ascending, elliptic to ovoid, membranaceous, glabrous, with many elevated nerves, sub-orbicular in cross-section, loosely enveloping the achene, rounded at the base, short-tapering and minutely beaked, the orifice entire or sub-emarginate. Achenes triangular, strongly apiculate, jointed with the slender style. Stigmas 3, short.

98. *C. Shriveri* Britton. Culms 1.5-7 dm. high; leaf-blades 4-16 mm. wide, somewhat glaucous; staminate spike short-stalked; bracts overtopping the culms, the ligules little elongated; perigynia narrowly obovoid, 2.5 mm. long, 1.5 mm. wide, the beak minute, entire; apiculation of the achene abruptly bent. Moist meadows: Me.—Va.—w S.D.—Sask. *Boreal*. Je-Jl.

99. *C. Crawei* Dewey. Culms from long creeping rootstocks, stiff, glabrous or nearly so, 0.7-4 dm. high; leaf-blades 2-4 mm. wide, rather stiff; bracts similar,

short, rarely overtopping the spikes; staminate spike long-stalked; pistillate spikes 1-4, distant, oblong, 10-45-flowered, sessile or stalked; perigynia ovoid, ascending, obscurely many-nerved, 3-3.5 mm. long, suborbicular in cross-section, rounded at the base, tapering into a very short beak; scales obovate, obtuse to cuspidate. Meadows and banks, limestone regions: N.S.—N.J.—Tenn.—Wyo.—Alta. My—Jl.

33. *DENILES* Carey. Culms aphyllopodic, strongly purplish tinged at base, tufted, slender, leafy. Leaf-blades flat. Terminal spike normally staminate. Lateral spikes 2-5, elongated, narrowly linear, slender-peduncled, the lower drooping. Bracts green-sheathing, the blades leaf-like. Perigynia appressed or ascending, lanceolate to ovoid, membranaceous, obsolete nerved, rather closely enveloping the achene, tapering to a well-developed conic beak, obliquely cut at orifice and strongly hyaline-tipped, at length bidentate. Achenes triangular, apiculate, jointed with the slender style. Stigmas 3.

100. *C. assiniboinensis* W. Boott. Culms 2.5-7.5 dm. high; leaf-blades 1-2 mm. wide; staminate spike long-stalked; pistillate spikes loosely 1-8-flowered; perigynia narrowly lanceolate, 6 mm. long, 2 mm. wide; scales lanceolate, scarious-margined, awned. Wet soil: Man.—Minn.—S.D.—N.D., doubtfully in our range. *Plain*. Je.

34. *CAPILLARES* Aschers & Graebner. Culms phyllopodic, light brown and leafy at base, tufted, very slender. Blades narrow. Terminal spike staminate. Lateral spikes 2-4, linear, drooping on long capillary peduncles, few-flowered in few ranks. Bracts green-sheathing, the blades developed. Perigynia appressed, ovoid, membranaceous, triangular, closely enveloping the achene, tapering into the slender conic beak, truncate and entire at orifice. Achene triangular, short-apiculate, jointed with the slender style. Stigmas 3.

101. *C. capillaris* L. Culms 0.5-6 dm. high, obtusely triangular, smooth; leaf-blades flat, 1-2 mm. wide; pistillate spikes 2-12-flowered; scales broadly hyaline-margined; perigynia 2.5-3 mm. long, the beak straight. Greenl.—N.H.—Mich.—Colo.—Utah.—Nev.—Alaska; Eurasia. *Alp.—Subalp.* Jl—Au.

35. *LONGIROSTRES* Kükenth. Culms phyllopodic, tufted, leafy towards the base. Blades flat. Terminal spike staminate. Lateral spikes 2-5, linear-oblong or oblong-cylindric, peduncled, many-flowered in several ranks. Bracts green-sheathing, the blades developed. Perigynia appressed to spreading, membranaceous, globose-triangular, somewhat inflated, prominently beaked, the apex bidentate, the teeth weak, scarious. Achenes triangular, apiculate, the apiculation very abruptly bent, jointed with the slender style. Stigmas 3.

102. *C. Sprengelii* Dewey. Culms 2.5-9 dm. high, roughish above, strongly fibrillose at the base; leaf-blades 2.5-4 mm. wide; pistillate spikes 10-40-flowered, scales acute to cuspidate; body of the perigynia 2.5-3 mm. long, short-oblong, exceeded by the slender beak. *C. longirostris* Torr. Alluvial banks: N.B.—N.J.—Colo.—Alta. *Plain—Submont.* My—Jl.

36. *FRIGIDAE* Fries. Culms phyllopodic, tufted, the leaves clustered near the base. Spikes staminate, pistillate, androgynous or gynaeandrous. Bracts green-sheathing, the blades developed or rudimentary. Scales dark tinged, usually with light midvein and margins. Perigynia appressed or ascending, flat to flattened-triangular, not inflated, dark tinged, beaked, the beak hyaline at orifice, more or less bidentate. Achenes triangular, short apiculate, jointed with the straight slender style. Stigmas 3.

103. *C. misandra* R. Br. Culms 3-40 cm. high; leaf-blades 2-3 mm. wide, much shorter than the culms; sheaths purplish tinged, the blades short; lateral spikes 1-3, filiform-stalked, drooping, 6-14 mm. long, 4 mm. wide, closely 5-20-flowered; scales blackish, with narrow hyaline margins; perigynia lanceolate, narrowed at both ends, serrulate above. High summits or arctic regions: Greenl.—Ont.—Alaska; Colo.; arctic Eurasia. *Arct.—Alp.* Jl—S.

104. *C. luzulina* Olney. Culms densely caespitose, 1.5-7.5 dm. high; leaves in a basal rosette, the blades soon spreading, 3-7 mm. wide, stiff; spikes 3-6, the

upper clustered, the lower widely separated, on long-exserted peduncles, the lateral pistillate, 6-8 mm. wide, linear, not compound at base; scales dark reddish brown or black, obtuse or acutish; perigynium body compressed-triangular, closely enveloping achene, 3.75-5 mm. long, not inflated or hispidulous, contracted into the short, sparingly ciliate-serrulate, shallowly bidentate beak. *C. ablata* Bailey. *C. owyheensis* A. Nels. Mountain meadows and bogs: Mont.—Wyo.—Calif.—B.C. *Mont.—Subalp.* Je-Au.

105. *C. fissuricola* Mackenzie. Culms 5-8 dm. high; leaves mostly clustered at the base, the blades 3-6 mm. wide, 7-14 cm. long; terminal spike sessile or short-stalked, often slightly pistillate; lateral spikes 4-5, the upper contiguous and sessile or short-peduncled, the lower separate and strongly peduncled; scales ovate, acute to cuspidate, brown, with lighter midrib conspicuous to apex, sparsely hairy when young; perigynium body narrowly ovate, much flattened, loosely enveloping the achene, 5 mm. long, 2 mm. wide, sparsely hairy when young, remotely ciliate-serrulate on the margins, contracted into a shallowly bidentate beak. *C. luzulaefolia* W. Boott, in part. Mountain meadows: (? Utah)—Nev.—Calif. *Mont.—Subalp.*

106. *C. petricosa* Dew. Stoloniferous; culms 1.5-2 dm. high, obtusely triangular, smooth; leaf-blades 2 mm. wide; spikes 3-5, oblong, 10-15 mm. long, closely flowered, the lower slender-peduncled; scales dark brown with hyaline margins; perigynia several-nerved, hispidulous, 4.5-5 mm. long, the orifice of the beak obliquely cut. Mountain summits: B.C.—Alta. *Alp.*

107. *C. Franklinii* Boott. Stoloniferous; culms 6-9 dm. high, obtusely triangular, smooth; leaf-blades 2 mm. wide; spikes 5-8, oblong, 1.2 cm. long, closely flowered, the lower slender-peduncled; scales brown with hyaline margins; perigynia with slender nerves, 4.5-5 mm. long, rough on the margins, the beak with obliquely cut orifice, becoming bidentate. Mountain summits: Canadian Rocky Mts. (About Lat. 56°.) *Alp.*

37. PALLESCENTES Fries. Culms aphyllopodic, tufted, leafy towards the base. Leaves pubescent. Terminal spike staminate, linear. Lateral spikes pistillate, closely 10-30-flowered in several rows. Bracts leaf-like, sheathless or nearly so. Perigynia green, rounded-triangular in cross-section, enveloping the achene, many-nerved, glabrous, rounded at the base, beakless or short-beaked. Achenes triangular, apiculate, the style thick, very short. Stigmas 3.

108. *C. abbreviata* Prescott. Culms 2.5-5 dm. high; leaflet-blades 1.5-3 mm. wide; pistillate spikes 1-3, short-oblong, 6-16 mm. long, 6 mm. wide, sessile or short-stalked, approximate; perigynia obovoid, 2.5-3 mm. long, strongly nerved, depressed at the apex, tipped by a short slender entire beak. *C. Torreyi* Tuckerm. Dry soil: Man.—Minn.—Colo.—Sask. *Plains—Submont.* Je-Jl.

38 ANOMALAE Carey. Culms stout, leafy. Leaf-blades broad, flat, glabrous, not septate-nodulose. Terminal spike staminate, linear. Lateral spikes pistillate, linear-cylindric, scattered, closely many-flowered in several rows. Bracts leaf-like, sheathless. Perigynia ascending or in age spreading, obovoid, small, 2.5-4 mm. long, olive-green, nerved, tapering at the base, triangular, slightly inflated, abruptly beaked, the beak conic, shallowly bidentate. Achenes triangular, subapiculate, the style short, thickish. Stigmas 3.

109. *C. amplifolia* Boott. Stoloniferous; culms 5-10 dm. high, sharply triangular; sheaths hispidulous; leaf-blades 8-18 mm. wide; pistillate spikes short-peduncled or nearly sessile, 3.5-8 cm. long, 6-7 mm. wide; scales acute to mucronate; perigynia 3 mm. long, nerveless except for the keels, glabrous. Wet soil: B.C.—Ida.—Calif. *Submont.* Je-Au.

39 LIMOSAE Tuckerm. Culms slender, leafy below. Leaf-blades narrow. Terminal spike staminate, linear. Lateral spikes 1-4, pistillate, distant, oblong, closely several-many-flowered in several ranks, drooping, on slender peduncles. Bracts leaflet-like, essentially sheathless (in our species). Perigynia appressed, coriaceous, ovoid, or elliptic, glaucous, papillose, beakless or nearly so. Achenes triangular, closely enveloped, the style short, straight, exserted, its base not enlarged. Stigmas 3.

110. *C. limosa* L. Culms 1.5-6 dm. high, sharply triangular; pistillate spikes 1-2.5 cm. long, 5-8 mm. thick, 8-30-flowered; scales acute or short-cuspidate; perigynia broadly ovate, flattened, 2-edged, 2.5 mm. long, 2 mm. wide, several-nerved. Sphagnum bogs: Lab.—N.J.—Ia.—Mont.—Wash.—Alaska; Eurasia. *Boreal*—Mont. My—Au.

111. *C. paupercula* Michx. Culms 1-8 dm. high, sharply triangular, pistillate spikes 0.5-2 cm. long, 4-8 mm. thick, 6-25-flowered; scales long-acuminate or awned; perigynia subglobose, 2.5-3 mm. long, 2.25 mm. wide, few-nerved. *C. magellanica* Am. auth. Sphagnum bogs: Newf.—Pa.—Minn.—Colo.—Utah—Alaska; Eurasia. *Submont.*—Mont. Au.

112. *C. Buxbaumii* Wahl. Densely caespitose; culms 2-9 dm. high, slender but stiff, strongly reddish-purple at base; leaf-blades 2-4 mm. wide; spikes 8-40 mm. long, 8 mm. wide, the perigynia numerous, 3-4 mm. long, glaucous-green, lightly many-nerved, the apex minutely bidentate; scales awned, exceeding the perigynia. *C. Holmiana* Mackenzie. Bogs: Greenl.—Ga.—Ark.—Colo.—Calif.—Alaska; Eurasia. *Mont.*—*Submont.* My—Jl.

40. ATRATAE Kunth. Culms leafy below. Terminal spike staminate or gynaeandrous, the lateral 1-10, normally pistillate, from sessile, erect, and closely approximate, to long-peduncled, nodding, and distant. Bracts sheathless or nearly so, dark-colored at the base, the blades short. Scales dark-tinged. Perigynia membranaceous, straw-colored, often dark-tinged, elliptic to broadly obovate, circular in cross-section to much flattened, papillose to punctulate, glabrous, abruptly short-beaked or beakless, the orifice entire or bidentate. Achenes triangular, the style slender, straight, often exserted, its base not enlarged. Stigmas 3.

113. *C. Parryana* Dewey. Stoloniferous, the culms 1-3.5 cm. high, fibrillose at the base; leaf-blades 2.5-4 mm. wide; spikes 1-5, often all pistillate, or the terminal staminate below or throughout, the lateral oblong or linear-oblong, erect, approximate; scales obtuse to mucronate, concealing the perigynia; perigynia 2.5 mm. long, 2 mm. wide, flattened and sharp-edged, lightly few-nerved, the beak minute, bidenticulate. *C. Elrodii* M. E. Jones Mountain meadows: Hudson Bay—N.D.—Colo.—Alta. *Plain*—Mont. My—Jl.

114. *C. Idahoa* Bailey. Culms 2-3.5 dm. high, fibrillose at the base; leaf-blades 2-4 mm. wide, flat; spikes usually 3, approximate, erect, the terminal staminate above, the lateral pistillate, 1-2 cm. long, 4-6 mm. wide; scales ovate to lanceolate, acuminate, concealing the perigynia; perigynia 3 mm. long, 2 mm. wide, faintly nerved, the beak 1 mm. long, bidenticulate. Mountain meadows: Mont.—Ida. *Mont.* Jl.

115. *C. podocarpa* R. Br. Culms aphyllopodic, triangular, slender, nearly smooth, 2-4 dm. high, from elongated tough rootstocks; leaf-blades 2-4 mm. wide; pistillate spikes 2-4, drooping, oblong or linear-oblong, 1-2 cm. long, 4.5-6 mm. wide, closely 15-30-flowered; perigynia ovate, flat, 4 mm. long, 2 mm. wide; achene stipitate. *C. montanensis* Bailey. Mountain sides and meadows: Alaska—Alta.—Mont.—Ida. *Mont.*—*Subalp.* Jl—Au.

116. *C. venustula* Holm. Culms sharply triangular, slender, nearly smooth, 2-5 dm. high, from stout rootstocks; leaf-blades erect-ascending, 2-4 mm. wide; pistillate spikes 1-3, drooping, oblong or linear-oblong, 0.5-2 cm. long, 4.5-7.5 mm. wide, closely 10-30-flowered; perigynia oblong-elliptic, flat, 4 mm. long, 1.5 mm. wide, sub-stipitate, exceeding the scales; achene short-stipitate. Mountains: Alta.—Alaska. *Subalp.* Jl—Au.

117. *C. spectabilis* Dewey. Culms aphyllopodic, sharply triangular, 2.5-5 dm. high, from densely matted tough rootstocks; leaf-blades 2-3.5 mm. wide; pistillate spikes 2-4, oblong, 1-2 cm. long, 3.5-5 mm. wide, closely 15-30-flowered; perigynia flat, 4 mm. long, 2 mm. wide; achene short-stipitate. *C. nigella* Boott. *C. inrsa* Bailey. Mountains and meadows: Alaska—Mont.—Calif. *Mont.*—*Alp.* Jl—S.

118. *C. Tolmiei* Boott. Culms phyllopodic, sharply triangular, rough above, 2.5-5 dm. high, from densely matted tough rootstocks; leaf-blades 2.5-

4.5 mm. wide; pistillate spikes 3-6, oblong-cylindric, 1-3 cm. long, 4-6 mm. wide, somewhat attenuate at the base, closely many-flowered; perigynia flat, 3 mm. long; achene short-stipitate. Mountains: Alta.—Wyo.—Ida.—Wash. *Mont.*—*Subalp.* Jl—Au.

119. *C. Reynoldsii* Dewey. Culms 2-4 dm. high, stout; rootstocks stout, stoloniferous; leaf-blades 3-8 mm. wide; pistillate spikes 2 or 3, approximate or the lowest separate, peduncled, erect, oblong, 1-2 cm. long, 7-8 mm. wide, closely 15-40-flowered; scales blackish, with light midvein, exceeded by the perigynia; perigynia oblong-oval, round in cross-section, 4.5 mm. long, 2 mm. wide, the short beak bidentate. *C. aboriginum* M. E. Jones. Mountain meadows and bogs: Alta.—Colo.—Calif.—Wash. *Mont.*—*Subalp.* Je—Au.

120. *C. Halleri* Gunn. Culms 1.5-6 dm. high, slender; leaf-blades 1-3 mm. wide; spikes 2-4, clustered, erect, sessile or short-peduncled, 4-10 mm. long, closely 8-25-flowered; scales black, shorter than the perigynia; perigynia minutely bidentate. *C. alpina* Sw. Rocky places: Greenl.—Ont.—N.M.—Alaska; Eurasia. *Alp.*—*Mont.* Jl—Au.

121. *C. Nelsonii* Mackenzie. Culms 2-4 dm. high, stiff, smooth, erect, fibrillose at base; leaf-blades 3-4 mm. wide; spikes 2 or 3, oblong or obovoid, 10-12 mm. long, 5-8 mm. wide, the lateral densely 15-35-flowered; scales black, the midvein obsolete; perigynia 4 mm. long, 1.5 mm. wide, roughened on edges above, the conspicuous black beak sharply bidentate. Mountain meadows: Wyo.—Colo. *Subalp.*—*Alp.* Jl—Au.

122. *C. albo-nigra* Mackenzie. Culms 1.5-3 dm. high, stiff, roughened above, slightly fibrillose at the base; leaf-blades 3 mm. wide; spikes usually 3, the lateral narrowly oblong, 8-10 mm. long, 4 mm. wide, closely 8-15-flowered, the terminal spike larger; scales with nearly obsolete midvein; perigynia blackish, 3 mm. long, 2 mm. wide, minutely roughened on margins. Mountain meadows. *Mont.*—Colo.—Ariz.—Utah. *Subalp.*—*Alp.* Jl—Au.

123. *C. nova* Bailey. Culms 1.5-6 dm. high, stiff, little roughened, fibrillose at the base; leaf-blades 2.5-5 mm. wide; spikes 2-4, broadly ovoid, 7-12 mm. long, 6-10 mm. wide, closely flowered; scales with inconspicuous midvein; perigynia blackish, 3-4 mm. long, 2-3.5 mm. wide, minutely roughened on the margins. Mountain meadows: *Mont.*—N.M.—Utah—Ida. *Mont.*—*Alp.* Je—Au.

124. *C. atrosquama* Mackenzie. Culms 3-4.5 dm. high, slender, often nodding, little roughened, slightly fibrillose at the base; leaf-blades 2.5-3.5 mm. wide; spikes 3-4, approximate, the lower 1-2 slender-peduncled, oblong, 6-12 mm. long, 5 mm. wide densely 15-30-flowered; scales black with obsolete midvein; perigynia olive-green, 3.25 mm. long, 1.75 mm. wide, round-tapering at the base, abruptly minutely beaked. Mountain meadows: Alta.—*Mont.*—Ida.—B.C. *Mont.* Jl—S.

125. *C. bella* Bailey. Culms 5-9 dm. high, slender, nodding, roughened above; leaf-blades 3-6 mm. wide; spikes 3-4, gynaeandrous, 1-3 cm. long, 4-6 mm. wide, 15-30-flowered; scales brownish black, mostly shorter than the perigynia; perigynia green or olive-green, 4 mm. long, 2 mm. wide, rounded at the ends. Mountain meadows: Colo.—N.M.—Ariz.—Utah. *Mont.*—*Alp.* Jl—Au.

126. *C. stratiformis* Britton. Culms 3-9 dm. high, slender, often nodding, roughened above, slightly fibrillose at the base; leaf-blades 3 mm. wide; spikes 3-4, oblong, 1-2.5 cm. long, 4-6 mm. wide, closely 10-30-flowered; scales dark reddish brown; perigynia 2.5-3 mm. long, 1.5 mm. wide, rounded at the base, round-tapering at the apex. Along streams: Lab.—Me.—Alta.—Yukon. *Mont.*—*Boreal.* Je—Au.

127. *C. chalciolepis* Holm. Culms 2-7 dm. high, slender, smooth, or nearly so; leaf-blades 3-6 mm. wide, the uppermost bract-like, 2-6 cm. below inflorescence; spikes 2-4, contiguous, oblong to broadly ovoid, 1-2 cm. long, 5-10 mm. wide, closely flowered in many rows; scales very thin, copper-colored, much narrower but longer than the perigynia, the midvein indistinct; perigynia 3-4 mm. long, 2.5-3 mm. wide, with broadly oval or obovate body, rounded at ends;

achenes short-stipitate. Mountain meadows. Mont.—Colo.—Ariz.—Nev. Mont.—Alp. Jl-S.

128. *C. atrata* L. Culms 2-7 dm. high, sharply triangular, more or less roughened; leaves all towards culm base, the blades 2-8 mm. wide; spikes 3-7, at least the lowest separate, oblong or obovoid-oblong, 1-3 cm. long, 5-10 mm. wide, closely flowered in many rows; scales brownish black, narrower but mostly longer than the perigynia, the midvein indistinct; perigynia 3-3.5 mm. long, oval; achenes 2 mm. wide, granular-roughened, short-stipitate. Mountain meadows: Greenl.—Mont.—Wyo.—Alaska; Eurasia. Alp.—Subalp. Je-Au.

129. *C. epapillosa* Mackenzie. Culms 1.5-6 dm. high, stiff, sharply triangular, smooth; leaves all towards base of the culm, the blades 3-8 mm. wide, nearly flat; spikes 3-6, approximate or the lowest a little separate, sessile or short-peduncled, oblong-obovoid, 1-2.5 cm. long, 6-10 mm. wide, closely flowered in many rows; scales lance-ovate, sharp-pointed, brownish black, narrower than, but about equalling or exceeding the perigynia, the midvein more or less prominent; perigynia broadly oval or obovate, 3.5-4 mm. long, 1.5-2 mm. wide, obscurely nerved, not granular; achenes slender-stipitate. Mountain meadows: Wyo.—Utah—Calif. Mont.—Alp. Je-Au.

130. *C. Mertensii* Prescott. Culms 3-10 dm. high, sharply triangular, rough; leaf-blades flat, 4-7 mm. wide; spikes 1-4 cm. long, 7-10 mm. wide, gynaeandrous, the perigynia numerous, appressed-ascending; scales lance-ovate, acute, brown, with light midvein and margins; perigynia tapering at the apex, minutely beaked. Mountains: Alaska—Mont.—Calif. Mont.—Submont. Jl-Au.

41. ACUTAE Fries. Culms leafy below, aphyllopodic or phyllopodic; terminal 1-several spikes staminate (rarely gynaeandrous), linear, the remaining pistillate, linear to cylindric or oblong, closely many-flowered, sessile or peduncled. Bracts sheathless (rarely short-sheathing), leafy or squamiform, bicauriculate and often darkened at the base. Perigynia membranaceous to coriaceous, plano- or bi-convex, or turgid, elliptic to obovate, punctulate, margined, beakless or abruptly minutely beaked, the orifice entire to deeply bidentate. Achenes normally lenticular. Style slender, straight, sometimes exserted, its base not enlarged. Stigmas normally 2.

131. *C. concolor* R. Br. Culms 1-5 dm. high, smooth; leaf-blades 3-7 mm. wide, with revolute margins; terminal spike staminate, linear; lateral spikes 1-4, short-oblong to linear-cylindric, 0.5-4 cm. long, 3-5 mm. wide, sessile or short-stalked; scales obtuse or acutish, blackish with lighter midvein; perigynia 2.5-3 mm. long, nerveless or nearly so, the orifice entire. *C. rigida* Good. *C. Bigelovii* Torr. Arctic-alpine regions: Greenl.—N.H.—Alta.—B.C.—Alaska; Eurasia. Alp.

132. *C. scopulorum* Holm. Loosely stoloniferous; culms 1-4 dm. high, sharply triangular, smooth; leaf-blades 3-7 mm. wide, with revolute margins; terminal spike androgynous or staminate; lateral spikes 2-3, approximate, erect, sessile or short-stalked, pistillate or androgynous, 1-2.5 cm. long, 6-7 mm. wide; scales obtuse, black, the midvein obsolete; perigynia 2.5-3.5 mm. long, with short but prominent beak, nerveless. Mountains: Mont.—Colo.—Wash. Mont.—Alp. Jl-Au.

133. *C. chimaphila* Holm. Loosely caespitose and stoloniferous; the culms 1-4 dm. high, scabrous, flattened, triangular; leaf-blades light green, 3-5 mm. wide, with slightly revolute margins; spikes 3-4, the upper approximate and sessile or short-peduncled, the lowest more distant, peduncled, the terminal staminate or androgynous, the lateral pistillate or androgynous, 1-3 cm. long, 7-10 mm. wide; scales lanceolate, acute or acuminate, black, with lighter or obsolete midvein; perigynia 2.5-3.5 mm. long, abruptly minutely beaked. Possibly merely a form of *C. scopulorum* Holm. Mountain slopes: Mont.—Colo. Alp.—Subalp. Jl-Au.

134. *C. aperta* Boott. Stoloniferous; the culms 5-10 dm. high, sharply triangular, rough above; leaf-blades 2.5-5 mm. wide; terminal spike staminate;

lateral spikes 2-3, pistillate, sessile to slender-peduncled, approximate, 12-48 mm. long, 5 mm. wide; scales lanceolate, sharp-pointed; perigynia obovoid, nerveless, abruptly minutely beaked. Low ground: B.C.—Mont.—Utah—Calif. *Submont.* Je-S.

135. *C. lenticularis* Michx. Densely cespitose; culms 3-6 dm. high, somewhat roughened; staminate spikes 1-2, often partly pistillate; pistillate spikes 2-5, sessile or short-peduncled, approximate or lower remote, 1-5 cm. long, 3-4 mm. wide; scales obtuse, with broad light-colored center; perigynia 2.5 mm. long, 1.5 mm. wide, minutely beaked. River and lake shores: Lab.—Mass.—Minn.—Sask. *Boreal.* Je-S.

136. *C. Kelloggii* W. Boott. Cespitose; culms 3-7 dm. high, slender, somewhat roughened; staminate spike usually 1; pistillate spikes 3-5, sessile or nearly so, approximate or slightly separate, linear, 1.5-4 cm. long, 4-6 mm. wide; scales obtuse or acutish, with broad light-colored center; perigynia 2.5 mm. long, 1.25 mm. wide, abruptly minutely beaked. *C. vulgaris* var. *hypocarpa* Holm. Alaska—Ida.—Colo.—Utah—Calif. *Submont.*—*Mont.* Je-Au.

137. *C. aquatilis* Wahl. Rootstock slender, stoloniferous; culms 2-7 dm. high, sharply triangular above, slender, reddened at the base; leaf-blades 2-4 mm. wide; staminate spikes 1-2, slender; pistillate spikes 2-4, sessile or short-peduncled, separate, linear, 1.5-6 cm. long, 4-6 mm. wide; scales oblong-obovate to lanceolate, obtuse or acutish, blackish, 1-nerved; perigynia elliptic-obovate, 2.5 mm. long, 1.25 mm. wide, nerveless, but with a median ridge, sub-stipitate, punctulate, reddish-dotted all over, granular, very minutely beaked. *C. variabilis* Bailey. *C. rhomboidea* Holm. Wet meadows and swamps: Lab.—Que.—N.M.—Calif.—Yukon; Eurasia. *Mont.*—*Subalp.* Je-Au.

138. *C. substricta* (Kukenth.) Mackenzie. Cespitose and stoloniferous; culms 6-14 dm. high, sharply triangular, reddened at the base; leaf-blades often glaucous, 4-8 mm. wide; staminate spikes 2-3, slender; pistillate spikes 2-4, sessile or short-peduncled, separate, linear, 2-7 cm. long, 4-6 mm. wide; scales lanceolate, sharp-pointed, reddish brown with broad light-colored center, narrower than the perigynia; perigynia 3 mm. long, obovate, tapering to the stipitate base, obscurely nerved, but the marginal nerves prominent, resinous-dotted, abruptly very minutely beaked. *C. aquatilis* Am. auth., not Wahl. Swamps: Me.—N.Y.—Neb.—Sask. *Plain.* Je-Au.

139. *C. nebraskensis* Dewey. Rootstocks creeping and stoloniferous; culms 2.5-10 dm. high; leaf-blades 4-8 mm. wide, flat; staminate spikes 1-2; pistillate spikes 2-5, sessile or short-peduncled, 1.5-6 cm. long, 6-9 mm. wide, contiguous or the lower separate; scales lanceolate, obtusish to acuminate, blackish with light midvein; perigynia ascending, 3-3.5 mm. long, 2 mm. wide, rounded at the base. Meadows and swamps: S.D.—Kans.—N.M.—Calif.—B.C. *Plain*—*Submont.* My-Jl.

140. *C. Emoryi* Dewey. Cespitose, long stoloniferous; culms 5-10 dm. high, sharply triangular, rarely reddened at the base; leaf-blades green, 3-7 mm. wide; staminate spikes 1-3, slender; pistillate spikes 2-4, sessile or short-peduncled, more or less strongly separate, narrowly linear, 4-10 cm. long, 3-5 mm. wide; scales lanceolate, sharp-pointed, with broad light-colored center and hyaline margins, narrower than the perigynia; perigynia very numerous, oval or ovate, 2.5 mm. long, rounded at the base, sessile or substipitate, few-nerved, the marginal nerves not prominent, punctulate, abruptly minutely but noticeably beaked. Swales and river banks: N.J.—D.C.—Tex.—N.M.—Colo.—N.D.—Man. *Plain*—*Submont.*

141. *C. prionophylla* Holm. Rootstocks thick; culms 5-9 dm. high, strongly aphyllopodic and reddened at base, wing-angled and serrulate; leaf-blades flat, 4-5 mm. wide, very scabrous; spikes 4-5, the terminal staminate, the lateral pistillate, contiguous or the lower separate, sessile or short-peduncled, 1-2 cm. long, 3-4 mm. wide; lowest bract dark-auricled; scales oblong-ovate; perigynia appressed, 2.5 mm. long, obovate, green, obscurely nerved, abruptly minutely beaked. Mountain streams: Ida.—Wash. *Submont.* Jl.

42. *HIRTAE* Tuckerm. Culms stout, leafy. Rootstocks with long stolons. Leaves septate-nodulose. Spikes 3-10, the upper 1-5 staminate, slender, the others pistillate, many-flowered, erect. Bracts leaf-like, equalling or exceeding the culm, often sheathing. Pistillate scales acute or aristate, ovate or lanceolate. Perigynia mostly ascending, coriaceous, ovoid or oblong-ovoid, somewhat inflated, nearly orbicular in cross-section, many-nerved, often hairy, round-tapering at the base, tapering into a bidentate beak. Achenes triangular, often stipitate, the faces flat or deeply concave, apiculate, continuous with the straight or slightly flexuous slender style. Stigmas 3.

142. *C. lacustris* Willd. Culms stout, purplish-tinged and filamentose at the base, 6-12 dm. high; leaf-blades 5-12 mm. wide, somewhat glaucous; staminate spikes 1-5, slender; pistillate spikes 2-5, 3-10 cm. long, 1 cm. wide; scales purplish tinged, acute to aristate; perigynia ovoid, 6 mm. long, 2.5 mm. wide, strongly nerved. In swamps: Newf.—Del.—Ia.—Man.—Ida. *Boreal.* Je-Jl.

143. *C. lanuginosa* Michx. Culms stoutish, more or less reddened and filamentose at the base, 6-9 dm. high, sharp-angled and rough above; staminate spikes 1-3, distant; pistillate spikes 1-3, 1-5 cm. long, 5-7 mm. wide; scales acuminate or aristate; perigynia ovoid, the beak bidentate. *C. Watsoni* Olney. Swampy places: N.S.—D.C.—Mo.—N.M.—Calif.—B.C. *Plain—Mont.* Je-Jl.

144. *C. lasiocarpa* Ehrh. Culms slender but stiff, strongly reddened and filamentose at the base, 6-9 dm. high, obtusely angled, smooth; staminate spikes 1-3, distant; pistillate spikes 1-3, 1-5 cm. long, 5-7 mm. wide; scales acute or short-awned; perigynia oval-ovoid, 2 mm. wide, the beak bidentate. *C. filiformis* Auth., not L. Swamps: Newf.—N.J.—Ia.—Colo.—Ida.—B.C.; Eurasia. *Plain—Submont.*

145. *C. Houghtonii* Torr. Long-stoloniferous; culms stoutish, 3-8 dm. high; leaf-blades 3-7 mm. wide; staminate spikes 1-3, distant; pistillate spikes 2 or 3, 1-4 cm. long, 7-12 mm. wide, rather loosely 15-35-flowered; scales lanceolate, short-awned; perigynia ovoid, 3 mm. wide. Sandy or rocky soil: N.S.—Me.—Minn.—Sask. *Boreal.* My—Au.

146. *C. laeviconica* Dewey. Culms 6-12 dm. high, very rough above; leaf-blades 3-6 mm. wide, glabrous; sheaths puberulent towards the top, breaking and becoming filamentose; staminate spikes 2-6, distant; pistillate spikes 2-4, densely flowered, except at the base, 2.5-10 cm. long, 10-16 mm. wide; perigynia ovoid, glabrous, 8-10 mm. long, 3-4 mm. wide. Marshes: Ill.—Man.—Mo.—Kans.—Mont.—Sask. *Plain.* My-Jl.

147. *C. atherodes* Spreng. Culms stout, 6-15 dm. high, often roughish above; leaf-blades 5-12 mm. wide, often pubescent beneath, as are the sheaths; staminate spikes 2-6, distant; pistillate spikes 3-5, densely flowered except at the base, 3-10 cm. long, 12-16 mm. wide; perigynia 8-12 mm. long. *C. aristata* R. Br. Marshes: N.Y.—Mo.—Colo.—Utah—Ore.—Yukon. *Plain—Submont.* Je-S.

148. *C. Sheldonii* Mackenzie. Strongly stoloniferous; culms very smooth below the spikes, 6-9 dm. high, neither bright-colored nor fibrillose at the base; leaves about four, the blades 5-6 mm. wide, 2-4 dm. long (or longer on sterile shoots), sparingly short-pubescent, as are the sheaths, the latter dark-tinged at the mouth, the basal breaking and slightly filamentose; staminate spikes 2-3, distant; pistillate spikes usually 2, widely separate, sessile or short-peduncled, oblong-cylindric, 2-5 cm. long, 8-10 mm. wide, rather closely 25-60-flowered, perigynia 5-6 mm. long, short-pubescent, the beak bidentate, the teeth less than 1 mm. long; scales ovate-lanceolate, acuminate or cuspidate. Swamps: Calif.—Ore.—Ida.

43. *EXTENSÆ* Fries. Culms slender, but strict, obtusely triangular, leafy towards the base. Leaves septate-nodulose, the blades narrow. Spikes 2-10, normally the terminal staminate, the others pistillate, suborbicular to oblong, densely flowered, 3 cm. or less long, the upper sessile and approximate, the lower remote, peduncled, erect. Bracts leafy, more or less sheathing. Pis-

tillate scales ovate, mostly reddish, copper- or chestnut-tinged. Perigynia ascending, spreading or deflexed, membranaceous, smooth, many-nerved, somewhat inflated, obscurely triangular, rounded at the base, contracted into a bidentate beak, the teeth very erect. Achenes triangular, with flat faces, continuous with the very slender erect or flexuous style. Stigmas 3.

149. *C. viridula* Michx. Densely caespitose, not yellowish green, the culms 0.7–4 dm. tall, smooth, bluntly triangular; leaf-blades 1.5–3 mm. wide, canaliculate, the sheaths not prolonged at throat; staminate spike sessile or short-peduncled; pistillate spikes 2–10, aggregate or the lower separate and exserted-peduncled, 4–12 mm. long, 4–7 mm. wide; scales ovate, much shorter than the perigynia, obtuse or acutish; perigynia whitish-tipped, tapering at the base. *C. Oederi* Am. auth., in part. Lake and river banks: Newf.—N.J.—N.D.—Colo.—Utah—B.C.—Calif. *Plain—Mont.* Je—Au.

150. *C. flava* L. Yellowish green; culms 1.5–6 dm. tall, smooth or nearly so; leaf-blades 2–5 mm. wide; staminate spike sessile or stalked; pistillate spikes 1–4, aggregated or the lower separate, 6–13 mm. long, 9–12 mm. wide; scales ovate, strongly reddish tinged, conspicuous at maturity; perigynia 5–6 mm. long, the beak deflexed, reddish-tipped. Wet meadows: Newf.—N.J.—Ohio—Mont.—B.C. *Mont.—Submont.* Je—S.

44. PAUCIFLORAE Tuckerm. Long-stoloniferous. Culms slender. Leaf-blades narrow. Spike solitary, androgynous, bractless, narrow. Pistillate scales soon falling. Perigynia few, short-stipitate, soon widely spreading or reflexed, obscurely triangular, straw-colored, subulate-beaked, obliquely cut. Achenes triangular, linear-oblong. Stigmas 3.

151. *C. microglochin* Wahl. Culms 8–25 cm. high, smooth; culm-leaves 4–8; pistillate scales very quickly deciduous; perigynia 3–12, 4–6 mm. long, obscurely nerved, smooth. Arctic-alpine localities: Greenl.—Ont.—Alta.—B.C.; reported from Colo.; Eurasia. *Alp.* Jl—Au.

152. *C. pauciflora* Lightf. Culms 10–25 cm. high, rough on the angles; culm-leaves 2–3; perigynia 1–6, 6–7 mm. long, obscurely several-nerved, smooth. Sphagnum swamps: Newf.—N.Y.—Mich.—Wash.—Alaska; Eurasia. (Not definitely known from our range.) *Boreal—Mont.* Je—Au.

45. PSEUDO-CYPHEREAE Tuckerm. Culms tall, generally stout, acutely angled, leafy below. Leaf-blades flat, septate-nodulose. Spikes 3–9, the upper 1–3 slender, staminate, the others normally pistillate, densely flowered, the upper approximate, the lower remote and strongly peduncled, often nodding. Bracts leaf-like, much exceeding the culms, mostly not sheathing. Pistillate scales aristate. Perigynia spreading or reflexed, membranaceous or stiff, triangular or circular in cross-section, 3–8 mm. long, closely many-ribbed, greenish straw-color, smooth, stipitate, contracted into a rigid, slender beak. Achenes triangular, continuous with the slender often flexuous style. Stigmas 3, short.

153. *C. hystricina* Muhl. Culms 3–9 dm. tall, reddened at the base, rough above; leaf-blades 3–8 mm. wide; staminate spike slender-stalked, the scales rough-awned; pistillate spikes 1–4, densely many-flowered, 1–6 cm. long, 10–14 mm. wide, the lower slender-stalked; scales rough-awned; perigynia 5–6 mm. long, 15–20-nerved. Swampy soil: Newf.—Ga.—Tex.—Ariz.—Calif.—Alta. *Plain.* Je—Au.

154. *C. comosa* Boott. Culms stout, up to 15 dm. tall, sharply angled; leaf-blades 6–14 mm. wide; staminate spike as in the last; pistillate spikes as in the last but 12–14 mm. wide; scales very rough-awned; perigynia rigid, closely many-ribbed, reflexed when mature. Swamps: N.S.—Minn.—Fla.—La.; Calif.—Wash.—Ida. *Plain—Submont.* Je—Au.

46. PHYSOCARPAE Drejer. Culms mostly tall and stout, leafy below. Leaves not hairy, septate-nodulose. Spikes 2–10, the upper 1–5 staminate, the others normally pistillate, subglobose to linear-cylindric, generally closely many-flowered, erect, short-peduncled, more or less remote. Bracts leaf-like, much

Family 14. **ARACEAE.** ARUM FAMILY.

Fleshy, perennial, mostly acaulescent herbs, with rootstocks. Leaves basal, usually petioled, with broad, simple or rarely divided, reticulate-veined blades, or narrowly linear with sheathing bases. Flowers perfect, monoecious or dioecious, borne in a dense fleshy spike (spadix); this subtended by or enclosed in a large foliaceous or colored bract (spathe). Perianth of seale-like members or wanting. Stamens 4-10, with very short filaments and thick connectives. Gynoecium of a single carpel or of several united carpels. Ovaries 1-several-celled; stigmas terminal; ovules 1 to several in each cavity. Fruit a berry or a utricle.

Spadix terminal, with an oblong sheathing spathe; leaves petioled, with broad blades.

Spadix borne somewhat laterally on the leaf-like scape; spathe leaf-like, continuous to the scape, leaves narrowly linear, equitant

1. **LYSICHITON.**

2. **ACORUS.**

1. **LYSICHITON** Schott. SKUNK CABBAGE.

Acaulescent perennial swamp plants, with short thick rootstocks. Leaves fleshy, petioled, with sheathing bases, the earlier reduced to merely inflated sheaths. Spathe sheathing at the base. Spadix cylindric, at last long-exserted. Flowers perfect, crowded. Perianth 4-lobed. Stamens 4, opposite. Pistil solitary; ovary 2-celled, 2-ovuled; stigma depressed. Ovules horizontal, orthotropous. Fruit fleshy.

1. **L. kamtschaticensis** Schott. Leaf-blades 3-7 dm. long, 7-25 cm. broad, elliptic to lance-oblong, acute at both ends; spathe oblong-lanceolate, 1-1.5 dm. long; peduncles 15-30 cm. long; spadix 7-12 cm. long, becoming 5-6 cm. thick. Swamps: Alaska—Mont.—Calif.; e Asia. *Submont.* My-Je.

2. **ACORUS** L. SWEET FLAG, CALAMUS-ROOT.

Erect swamp plants, with long horizontal rootstocks. Leaves sword-shaped, equitant. Scapes 3-angled, bearing a lateral spadix and a foliaceous spathe, continuous with the scape. Flowers perfect, densely crowded on the spadix. Perianth with 6 membranous concave divisions. Stamens 6. Pistil solitary; ovary 2-4-celled, each 2-8-ovuled; stigma depressed-capitate. Fruit berry-like.

1. **A. Calamus** L. Leaves linear, erect, 5-20 dm. long, 1-2 cm. wide, long-attenuate, 2-ranked; scape 1-2 m. high; spathe 2-7.5 dm. long; spadix 5-7 cm. long, about 1 cm. thick, lance-cylindric; plant seldom fruiting. Swamps and streams: N.S.—Fla.—Tex.—Colo.—Ida.—Mont.; Eurasia. *Plain.* My-Jl.

Family 15. **LEMNACEAE.** DUCKWEED FAMILY.

Minute floating perennial aquatics, consisting of a fleshy or membranaceous, loosely cellular thallus-like stem, without leaves and in our genera with one or more rootlets. The new stems or fronds are produced from two lateral depressions or pouches or a terminal one; the new frond being attached to the old one by a short, slender stalk, soon separating. Flowers very rare. Inflorescence consisting of 1 pistillate and 1 or 2 staminate flowers, borne on the edge on the upper surface of the frond. Staminate flower of a single stamen, with 2-4 pollen-sacks. Pistillate flowers of a single flask-like pistil, with 1-several ovules. Fruit a 1-6-seeded utricle.

Rootlets solitary, without a fibro-vascular bundle

Rootlets several, each with a fibro-vascular bundle.

1. **LEMNA.**

2. **SPIRODELA.**

1. **LEMNA** L. DUCKWEED.

Frond disk-like, 1-5-nerved or nerveless. Stipe attached to the basal margins of the frond. Rootlet solitary, without fibro-vascular bundles. Anthers dehiscent transversely.

- Fronds long-stalked, mostly submerged, forming large masses
 Fronds short-stalked or sessile, floating on the surface.
 Frond pale and usually strongly gibbous beneath.
 Fronds green or purplish, not gibbous beneath.
 Frond oblong-obovate, indistinctly 3-nerved.
 Frond oblong or elliptical, indistinctly 1-nerved or nerveless.
 Frond unsymmetrical, without papules
 Frond symmetrical, with a row of papules along the midvein.

1. *L. trisulca*.
 2. *L. gibba*.
 3. *L. minor*.
 4. *L. cyclostasa*.
 5. *L. minima*.

1. *L. trisulca* L. Fronds usually submerged, seldom floating, usually several generations attached together, oblong to oblong-lanceolate, slightly unsymmetrical and falcate, dentate towards the upper end, 5-10 mm. long, 2-3 mm wide. In springs and running water: N.S.—N.J.—Tex.—Calif.—B.C.; Old World and Australia. *Plain—Mont.* Jl—Au.

2. *L. gibba* L. Fronds solitary or 2-4 in a group, orbicular to obovate, 2-5 mm. long and 2-4 mm. wide, thick, convex and slightly keeled above, with large air-cavities in the gibbous portion, unsymmetrical, 3-5-nerved. In ponds: Neb.—Tex.—Ariz.—Calif.; Mex.; Old World and Australia. *Plain—Subalp.*

3. *L. minor* L. Fronds solitary or a few together, round to oval, symmetrical, thickish, convex on both sides, sometimes slightly keeled above and with a row of papules along the midrib. In stagnant water and slow streams: Lab.—Fla.—Calif.—Alaska; Mex.; Old World and Australia. *Plain—Mont.*

4. *L. cyclostasa* (Ell.) Chev. Frond solitary or 2-8 in a group, oblong to obovate-oblong, usually somewhat falcate, 2.5-4.5 mm. long, 1-1.5 mm. wide, usually unsymmetrical at the base. *L. valdiviana* Philippi. In pools and streams: Mass.—Fla.—Calif.—Ida.; Mex.—S. Am. *Plain—Submont.*

5. *L. minima* Philippi. Fronds solitary or in groups of 2-4, oblong or elliptical, symmetrical, 1.5-4 mm. long, 1-2.75 mm. wide, both surfaces convex or the lower flat, with a thin margin around the frond. In pools: Ga.—Kans.—Wyo.—Calif.; Mex.—S. Am. *Plain—Submont.*

2. SPIRODELA Schleiden. LARGER DUCKWEED.

Frond disk-like, several-nerved. Stipe attached peltately to the frond back of and under the basal margin. Rootlets several, each with a solitary fibro-vascular bundle. Anthers dehiscent longitudinally.

1. *S. polyrhiza* (L.) Schleiden. Frond solitary or in colonies of 2-5, roundish obovate, flat on both sides, green above, generally purplish beneath, 5-15-nerved, 2.5-4.5 mm. wide and 2.5-8 mm. long; rootlets 4-16. In pools and ponds: N.S.—B.C.—Fla.—Mex.; Old World and S. Am. *Plain.*

Family 16. COMMELINACEAE. SPIDERWORT FAMILY.

Somewhat succulent herbs, with fibrous or tuberous-thickened roots and alternate leaves sheathing at the base. Flowers perfect, subtended by leaf-like sheathing bracts. Sepals 3, herbaceous. Corolla regular or irregular, with 3, usually showy, colored petals. Stamens 6 or 5, sometimes 2 or 3 of these sterile. Gynoecium of 2 or 3 united carpels; ovary superior, 2- or 3-celled; styles united. Fruit a loculicidal capsule.

Petals all alike; perfect stamens 6; bracts leaf-like.
 Petals unlike in shape and size; perfect stamens 3 or 2; bracts spathe-like.

1. TRADESCANTIA.

2. COMMELINA.

1. TRADESCANTIA (Rupp.) L. SPIDERWORT.

Caulescent perennials, with alternate narrow leaves. Cymes umbel-like, terminal, subtended by usually 2 bracts, similar to the leaves. Sepals 3, nearly equal, distinct. Petals 3, showy, blue, rose-color or white, sessile, similar and equal, delicate. Stamens 6, all perfect; filaments filiform, in ours long-hairy. Capsule loculicidal, 3-valved. Seeds 3-6, more or less sculptured.

Sepals glandular-pilose; petals about 15 mm. long; capsule decidedly ellipsoid.

Bracts broader than the leaves, strongly gibbous at the base; stem 2-3 dm high, usually simple; pod densely glandular.

1. *T. bracteata*.

Bracts not broader than the leaves, not strongly gibbous at the base; stem usually over 3 dm. high, branched.

Pod densely glandular-pubescent; sepals broadly lanceolate, densely glandular; plant bright green; branches shorter than the stem proper. 2. *T. occidentalis*.

Pod glabrate, pubescent only in lines or at the apex.

Pedicels strongly glandular; pods pubescent in lines, branches almost equalling the stem 3. *T. larimensis*.

Pedicels glabrous or slightly glandular above; pods pubescent only at the apex. 4. *T. universitatis*.

Sepals glabrous or nearly so; petals about 10 mm. long, capsule subglobose. 5. *T. scopulorum*.

1. *T. bracteata* Small. Stem erect, 1-3 dm. high, simple, or sparingly branched, glabrous; leaves linear, 1-2 dm. long, long-acuminate; sepals ovate-lanceolate; corolla about 2.5 cm. broad. Wet meadows: Minn.—Mo.—Kans.—S.D. *Plain*—*Submont.*

2. *T. occidentalis* (Britton) Smyth. Stem stout, branched, erect, 2-5 dm. high; leaves narrowly linear, 2-3 dm. long, attenuate, with rather loose sheaths, glabrous; bracts 5-15 cm. long; sepals ovate-lanceolate, acute, about 1 cm. long; petals blue or rose-colored, 12-15 mm. long. Wet meadows: Ia.—Mo.—Colo.—S.D. *Plain*—*Submont.*

3. *T. larimensis* Goodding. Stem 3-4 dm. high, branched, erect, glabrous; leaves narrowly linear, 2-3 dm. long, spreading; bracts narrow, 2-3 mm. broad; sepals lanceolate, acute, 10-12 mm. long; petals dark blue, 15-20 mm. long; filaments strongly woolly below. Wet places: Mont.—Colo.—Utah. *Plain*—*Submont.*

4. *T. universitatis* Cockerell. Stem 3-4 dm. high, branched; leaves ascending, linear, attenuate, 2-3 dm. long; bracts narrower, 1-2 dm. long; sepals narrowly lanceolate, about 1 cm. long, acuminate; petals blue, broadly ovate, acute, 15 mm. long. Scarcely distinct from the preceding. Wet places: Mont.—S.D.—Colo. *Plain*—*Submont.*

5. *T. scopulorum* Rose. Stem more or less branched, 3-4 dm. high; leaves erect, 1-2 dm. long, linear, attenuate; bract narrow, unequal, glabrous; sepals broadly lanceolate, 8 mm. long; petals 1 cm. long or less, blue. Wet places: Ariz.—Utah—Colo.—N.M. *Son.*—*Submont.*

2. COMMELINA (Plum.) L. DAY-FLOWER, DEW-FLOWER.

Mostly perennials, with alternate leaves. Bracts usually spathe-like, folded. Flowers irregular, in small cymes. Sepals 3, unequal, the larger two more or less united. Petals 3, usually blue, two larger than the third. Fertile stamens 3, rarely 2; filaments slender, glabrous; sterile stamens 2 or 3, smaller than the fertile ones. Seeds 2, one above the other, or solitary.

1. *C. crispa* Wooton. Perennial, with tuberous roots; stem 3-8 dm. high, branched, finely villous-pubescent above; leaves linear-lanceolate, 3-7 cm. long, 4-6 mm. wide; spathe 1.5-2 cm. long, strongly curved, pubescent and bearded at the base; sepals broadly elliptic-rotund, the upper one slightly narrower and half as long; upper two petals broadly reniform, 1-1.5 mm. long, bright blue, the third white, lanceolate, 2-3 mm. long; fertile stamens 3; staminodia 3. Sandy places: Ind.—Neb.—Colo.—Ariz.—Tex. *Plain.*

Family 17. PONTEDERIACEAE. PICKEREL-WEED FAMILY.

Perennial bog or water plants, with rootstocks and alternate or basal leaves. Flowers perfect, more or less irregular. Sepals and petals each 3, both colored and partly united. Stamens 3-6; filaments partly adnate to the perianth. Pistil of 3 united carpels; ovary 3-celled, or by abortion 1-celled. Fruit a many-seeded capsule or a 1-seeded utricle.

Stamens unequal, the 2 posterior ones with ovate anthers, the third with a sagittate anther; capsule incompletely 3-celled; leaf-blades broad, long-petioled.

1. *HETERANTHERA*.
Stamens all alike; anthers all sagittate, capsule 1-celled, with 3 parietal placentae; leaf-blades linear, translucent, sessile. 2. *ZOSTERELLA*.

1. **HETERANTHERA** R. & P. MUD-PLANTAIN.

Creeping or floating water plants. Leaves long-petioled, with broad, ovate, cordate, rounded, or reniform blades, sometimes reduced to phyllodes. Flowers perfect, solitary or few, subtended by a spathe-like bract. Perianth white or blue, with a slender tube. Stamens 3; anthers introrse, that of the anterior stamen sagittate, those of the other two ovate. Ovary incompletely 3-celled; ovules numerous in two rows on each placenta.

1. **H. limosa** (Sw.) Willd. Stem floating, 1-5 dm. long, branched; leaves petioled; petioles 3-20 cm. long; blades ovate to oblong-ovate, 1-3 cm. long, rounded or subcordate at the base; spathe 1-flowered; perianth blue or white; tube 1.5-2 cm. long; lobes linear. Shallow water: Va.—Fla.—Mex.—Colo.—S.D.; W. Ind. and Trop. Am. *Plain.* Je—Au

2. **ZOSTERELLA** Small. WATER STAR-GRASS.

Submersed grass-like plants. Leaves sessile, narrowly linear, translucent. Flowers perfect, 1 or 2, subtended by a bract. Perianth yellow, with a slender tube. Stamens 3; anthers all sagittate, introrse. Ovary 1-celled with 3 parietal placentae; ovules numerous, 2-ranked. [*Schollera* Schreb.]

1. **Z. dubia** (Jacq.) Small. Stem floating or creeping, 2-10 dm. long, branched; leaves linear, flat, sheathing at the base, 1-2 dm. long; perianth-tube 1 mm. thick; lobes linear, 8-12 mm. long. *Heteranthera graminea* (Michx.) Vahl. *H. dubia* (Jacq.) MacM. Still water: Ont.—Fla.—Mex.—Ore.; W. Ind. *Plain.* My—S.

Family 18. **MELANTHACEAE**. BUNCH-FLOWER FAMILY.

Leafy-stemmed perennials, with rootstocks or solid bulbs. Flowers racemose or paniculate, perfect, dioecious, or polygamous. Petals and sepals each 3, distinct or nearly so. Stamens 6; filaments often partly adnate to the base of the sepals and petals; anthers versatile. Pistil of 3 united carpels; ovary 3-celled; styles 3. Fruit a septical capsule.

Plants with rootstocks (except in No. 3); petals and sepals glandless.

Anthers oblong or ovate, 2-celled

Anthers introrse; flowers involucrate with 3 bractlets

Anthers extrorse, flowers not involucrate

Anthers cordate or reniform, confluent 1-celled

Flowers racemose, perfect, nodding, plants glabrous, with narrow leaves

Flowers paniculate, polygamous; more or less pubescent plants, with broad plaited leaves

Plants with bulbs, petals and sepals with a more or less distinct gland

Ovary partly inferior; gland obcordate

Ovary wholly superior, gland obovate or semiorbicular.

1. **TOFIELDIA**

2. **XEROPHYLLUM**.

3. **STENANTHELLA**.

4. **VERATRUM**.

5. **ANTICLEA**.

6. **TOXICOSCORDION**.

1. **TOFIELDIA** Huds. SCOTTISH ASPHODEL.

Perennial herbs, with short rootstocks, fibrous roots, 2-ranked linear equitant leaves, and small flowers in a terminal raceme. Flowers involucrate by 3, more or less united bractlets below the calyx. Petals and sepals oblong or obovate, subequal, persistent, glandless. Stamens 6; anthers ovate, introrse. Capsule septical to the base, many-seeded.

Stem glabrous, scapiform, seed unappendaged.

Stem leafy at the base only, flowers short-pedicelled.

Stem with a leaf also at or above the middle, flowers sessile

Stem viscid-pubescent, at least above; seeds appendaged

Bractlets broadly triangular, connate two-thirds their length.

Bractlets lanceolate-triangular, connate half their length or less.

1. *T. palustris*.

2. *T. coccinea*.

3. *T. intermedia*.

4. *T. occidentalis*.

1. **T. palustris** Huds. A glabrous plant, with a scape-like, leafless stem, 3-15 cm. high, and a few basal leaves, 2-10 cm. long; raceme in flower short, oblong, dense; flowers greenish; petals and sepals obovate, obtuse; capsule oblong-globose, minutely beaked. In wet places: Greenl.—Que.—Minn.—B.C.; Alaska; Eu. *Alp.*—*Subalp.* Je—Jl.

2. *T. coccinea* Richardson. A glabrous plant; stem 5-10 cm. high; basal leaves 2-6 cm. long, 3-4 mm. wide; spike short-oblong or globose; flowers tinged with purple; fruit dark purple. In wet places: Mack.—Alta.—Alaska. *Alp.* Jl.

3. *T. intermedia* Rydb. Stem leafy, 1.5-3 dm. high, viscid-pubescent above; leaves 5-20 cm. long, 2-5 mm. wide; raceme short, dense, 1-2 cm. long. pedicels usually 3 together; flowers yellow; sepals obovate, 4-5 mm. long; petals somewhat narrower and longer; capsule ovoid, about 5 mm. long. Bogs: Sask; —Wyo.—Calif.—Alaska. *Mont.*—*Alp.* Je—Au.

4. *T. occidentalis* S. Wats. Stem leafy, 3-5 dm. high, viscid-pubescent above; leaves 5-20 cm. long, 2-6 mm. wide, acute; raceme 3-5 cm. long; flowers as in the preceding, but sepals and petals narrower; capsule ovoid, about 8 mm. long. In bogs: B.C.—Calif.—Ida. *Mont.* Je—Au.

2. *XEROPHYLLUM* Michx. TURKEY-BEARD, BEAR-GRASS, MOOSE-GRASS, PINE-GRASS.

Glabrous perennial plants, with thick rootstocks, numerous narrowly linear leaves with rough margins, and a single, dense and many-flowered raceme. Flowers perfect, whitish; petals and sepals subequal, ovate or oblong, 5-7-nerved, withering-persistent, claw- and gland-less. Anthers oblong, 2-celled, extrorse. Styles 3, reflexed. Capsule ovoid; seeds 2 in each cell, oblong.

Petals and sepals 7-10 mm long
Petals and sepals 4-6 mm long.

1. *X. tenax*
2. *X. Douglasii*.

1. *X. tenax* (Pursh) Nutt. A light green perennial, 5-15 dm. high; lower leaves very numerous, firm, strongly 1-nerved, 2-4 dm. long, 2-4 mm. wide; upper stem-leaves subulate, with broad scarious bases; pedicels slender, 3-5 cm. long; petals and sepals narrowly oblong, shorter than the filiform filaments; capsule broadly ovate. On dry hillsides: Mont.—B.C.—Calif.—Ida. *Mont.* Je—Jl.

2. *X. Douglasii* S. Wats. Similar to the preceding; pedicels 1-3 cm. long, more erect; sepals and petals equalling the stamens; capsule cordate-ovate. Dry hills: Ore.—Mont. *Mont.* Je—Jl.

3. *STENANTHELLA* Rydb.

Erect bulbous glabrous herbs, with few narrow leaves and racemose or paniculate, perfect, greenish, brownish, or purplish flowers. Petals and sepals each 3, subequal, withering-persistent, narrowly lanceolate, acuminate, with reflexed tips, without gland and distinct claw. Stamens 6, free, included; anthers reniform, confluent 1-celled. Capsule lance-ovoid, septicidal to the base, wholly superior. Seeds oblong, winged.

1. *S. occidentalis* (A. Gray) Rydb. Stem 3-5 dm. high; leaves linear or linear-oblancoelate, acute, 1-2 dm. long, 3-20 mm. wide; raceme simple or branched below; flowers narrowly bell-shaped, 10-12 mm. long; capsule about 2 cm. long. *Stenanthium occidentale* A. Gray. In wet places: Alta.—B.C.—Ore—Ida. *Mont.*—*Alp.* Je—Au.

4. *VERATRUM* (Tourne.) L. WHITE HELLEBORE, FALSE HELLEBORE, SKUNK CABBAGE.

Tall poisonous perennials, with broad strongly veined and plaited leaves, and stout rootstocks. Flowers paniculate, generally polygamous, i. e., the upper perfect and the lower staminate. Petals and sepals each 3, subequal, glandless and clawless. Stamens 6, free; anthers cordate, their sacks confluent. Fruit a many-seeded, slightly inferior capsule. Seeds flat, broadly winged.

Flowers greenish; bractlets foliaceous, often equalling or exceeding the flowers.

Flowers white or yellowish white; bractlets membranous, much shorter than the pedicels and flowers.

Petals and sepals oval or broadly oblanceolate.
Petals and sepals narrowly oblanceolate.

1. *V. Eschscholtzianum*.
2. *V. speciosum*.
3. *V. tenuipetalum*.

1. *V. Eschscholtzianum* (R. & S.) Rydb. Stem 1-2 m. high; leaves from broadly round-oval to oblong, or the uppermost lanceolate, sessile and sheathing at the base, 2-3 dm. long; petals and sepals oblanceolate, 8-10 mm. long, acute or obtuse, fully twice as long as the stamens. Closely related to *V. viride* Ait of the East, which has longer bracts and stamens. In wet woods: Mont.—Ida.—Ore.—Alaska. *Mont.*—*Subalp.* Jl-S.

2. *V. speciosum* Rydb. Stem 1-3 m. high; leaves, except the uppermost, broadly oval, 2-3 dm. long, 1-2 dm. wide, finely soft-pubescent beneath, sessile and sheathing; petals and sepals yellowish white, mostly obtuse, 5-7-nerved, 8-10 mm. long. *V. californicum* S. Wats., not Durand. *V. Jonesii* Heller Brook- and river-banks: Wash—Calif.—N.M.—Mont. *Submont.*—*Mont.* Jl-Au.

3. *V. tenuipetalum* Heller. Like the last, but still more leafy; leaves very concave; panicle more compound and very many-flowered; petals and sepals mostly acute, 3-5-nerved, 6-8 mm. long and about 2 mm. wide. In mountain meadows: Colo. *Submont.*—*Mont.* Jl.

5. ANTICLEA Kunth. WHITE CAMAS.

Bulbiferous glabrous perennials. Leaves linear, sheathing. Flowers perfect, greenish or yellowish white, in racemes or panicles. Petals and sepals nearly alike, elliptic to obovate, withering-persistent, bearing an obcordate gland within above the narrowed base, perigynous. Stamens free; anthers cordate or reniform. Ovary partly inferior. Seeds numerous, angled.

Base of the stem not covered by conspicuous scarious sheaths, plant not tufted.

Petals and sepals greenish, the former more or less contracted into a broad claw.

Petals and sepals white or straw-colored, greenish only on the midrib, not at all clawed.

Petals and sepals 7-13-nerved

Stem more or less leafy, 3-6 dm. high; petals white, 7-8 mm. long

Stem scapiform, 1-2 dm. high; petals straw-colored, 5-6 mm. long

Petals and sepals 5-6 mm. long, 3-7-nerved

Inflorescence usually simple, few-flowered, petals and sepals usually nearly 6 mm. long; flowers not recurved after anthesis

Inflorescence branched, many-flowered; petals and sepals rarely exceeding 5 mm. in length, flowers reflexed just after anthesis.

Base of the stem covered by numerous, conspicuous, scarious sheaths, plant growing in big clumps.

1. *A. chlorantha* (Richardson) Rydb. Stem glabrous, green, 3-10 dm. high; leaves 1-3 dm. long, 5-12 mm. wide, keeled; flowers paniculate, about 1 cm. long; sepals and petals usually 7-nerved, elliptic; capsule ovoid. *Zygadenus chloranthus* Richardson. *Z. glaucus* Nutt., in part. Rocky or stony places, often on limestone: N.B.—N.Y.—Ill.—S.D.—Sask. *Boreal.* Je-Au.

2. *A. elegans* (Pursh) Rydb. Stem glabrous, light green, 3-6 dm. high; leaves 1-3 dm. long, 5-15 mm. wide, keeled; flowers racemose, or rarely paniculate, dirty white; bracts ovate to lanceolate, often membranous-margined; petals and sepals obovate or oval, obtuse; capsule ovoid. *Z. elegans* Pursh. *Z. glaucus* Nutt., in part. *Z. dilatatus* Greene. In meadows: Sask.—N.D.—N.M.—Nev.—Alaska. *Plain*—*Subalp.* Je-Au.

3. *A. alpina* (Blankinship) Heller. Stem 1-2 dm. high, subscaipiform with one or two bracts or small leaves; basal leaves 6-12 cm. long, 2-4 mm. wide; bracts ovate, scarious, purple-veined; sepals and petals cream-colored, obovate, capsule narrow. *Z. alpinus* Blankinship. Mountains: Mont. *Subalp.* Jl-Au.

4. *A. coloradensis* Rydb. A rather slender glabrous plant, 2-4 dm. high; leaves narrow, erect, about 2 dm. long, 3-5 mm. wide; flowers racemose, yellowish white, tinged with brownish or purplish; bracts linear-lanceolate; petals and sepals oblong or narrowly obovate, acute; capsule ovoid. Mountains: N.M.—Colo.—Utah. *Mont.*—*Subalp.* Jl-Au.

5. *A. porrifolia* (Greene) Rydb. Stem slender, 3-6 dm. high; leaves thin, pale, 2-4 dm. long, 6-12 mm. wide; bracts lanceolate, green; pedicels 1-3 cm.

long; sepals and petals elliptic, not clawed, greenish white; capsule ovoid. *Z. porrifolius* Greene. Mountains and cañons: Ariz.—se Utah—N.M.—Mex. *Submont.* Jl—Au.

6. *A. vaginata* Rydb. Growing in clumps; stem 7–10 dm. high; leaves linear, 3–7 dm. long, 6–10 mm. wide, with numerous veins; inflorescence paniculate; bracts linear or subulate, 3–6 cm. long, green, or the upper ovate, white; petals and sepals white, elliptic, 7–8 mm. long, 7-nerved. Loose soil under overhanging cañon walls: se Utah. *Son.* Au.

6. **TOXICOSCÖRDION** Rydb. POISON CAMAS, DEATH CAMAS.

Bulbiferous glabrous, more or less poisonous perennials, with narrow linear conduplicate leaves and yellowish racemose or paniculate flowers. Flowers perfect. Petals and sepals bearing an obovate or semiorbicular gland at or above the base of the blade. Ovary wholly superior. Stamens more or less adnate to the base of the petals and sepals; anthers sub-reniform, confluent 1-celled. Seeds numerous.

Petals and sepals rounded or obtuse at the apex.

Upper leaves without sheaths at the base; both petals and sepals distinctly clawed and subcordate at the base; gland with a thick, toothed margin. 1. *T. venenosum*.

All leaves with distinct sheaths, petals long-clawed and subcordate at the base; sepals subsessile, margin of the gland ill-defined. 2. *T. gramineum*.

Petals and sepals acute or acuminate at the apex; all leaves with sheaths; sepals cuneate at the base and short-clawed or subsessile.

Leaves less than 5 mm. wide; petals and sepals both cuneate at the base and short-clawed. 3. *T. acutum*.

Leaves over 5 mm. wide.

Raceme simple; petals comparatively long-clawed and subcordate at the base.

4. *T. falcatum*.

Raceme branched; petals short-clawed, not subcordate at the base.

5. *T. paniculatum*

1. *T. venenosum* (S. Wats.) Rydb. Stem 3–6 dm. high; leaves narrowly linear, striate, scabrous, 1.5–3 dm. long, 4–6 mm. wide; raceme many-flowered, in fruit elongate; petals and sepals about 5 mm. long; claw about 1 mm. long; blades of the sepals broadly ovate, those of the petals more elliptic-ovate. *Zygadenus venenosus*. S. Wats. *Z. salinus* A. Nels. Hillsides: Mont.—Utah—Calif.—B.C. Plain—*Submont.* Je—Au.

2. *T. gramineum* Rydb. Stem 2–3.5 dm. high; leaves linear, 1–2 dm. long, 3–9 mm. wide; flowers light yellow; sepals broadly ovate, obtuse; petals ovate, obtuse, subcordate at the base. *Z. gramineus* and *Z. intermedium* Rydb. Hills and meadows: Sask.—S.D.—Colo.—Utah—Ida. *Submont.*

3. *T. acutum* Rydb. Stem 3–5 dm. high; leaves narrowly linear, scabrous on the margin, about 2 dm. long and 4–5 mm. wide; petals and sepals 4–5 mm. long, both acute at the apex and at the base; glands obovate or cuneate. *Z. acutus* Rydb. Hillsides: (Black Hills) S.D. *Submont.* Je—Jl.

4. *T. falcatum* Rydb. Stem stout, 3–4 dm. high; leaves scabrous, 1.5–2.5 dm. long, 5–8 mm. wide; raceme short, in fruit elongate; petals and sepals about 5 mm. long, acute; the former deltoid-ovate, acute at the base; glands semi-orbicular, upper margin toothed, thin and not well defined. *Z. falcatus* Rydb. Hills and table-lands: Colo.—n N.M. *Submont.* Je—Au.

5. *T. paniculatum* (Nutt.) Rydb. Stem stout, 3–6 dm. high; leaves striate, scabrous, 2–4 dm. long, 5–10 mm. wide; flowers panicled, rarely racemose, yellow; petals and sepals 4–5 mm. long; both ovate or deltate-ovate, acute at both ends and short-clawed; glands semi-orbicular, upper margins toothed, thin and ill-defined. *Z. paniculatus* S. Wats. On hills: Mont.—N.M.—Calif.—Wash. *Son.*—*Submont.* My—Je.

Family 19. **JUNCACEAE.** RUSH FAMILY.

Grass-like herbs. Flowers perfect, regular, inconspicuous; sepals and petals each 3, similar, scale-like. Stamens 6 or 3, rarely 4 or 5; anthers introrse. Pistil of 3 united carpels; ovary 1- or 3-celled; stigmas 3. Fruit a loculicidal capsule. Seeds 3-many, often apiculate or tailed.

Leaf-sheaths open; capsule 1-3-celled, with axile or parietal placentae, seeds many.

1. JUNCUS.

Leaf-sheaths closed; capsule 1-celled, with basal placentae, seeds 3.

2. JUNCOIDES

1. JUNCUS (Tourn.) L. RUSH, WIRE-GRASS.

Caulescent or rarely scapose swamp plants, with glabrous leaves and stems. Leaves with laterally or vertically flattened, or terete leaf-blades, or the latter sometimes wanting; sheaths with free margins. Cymes paniculate, corymbiform or capitate. Flowers subtended by a bract and sometimes also by 2 bractlets. Stamens 6 or 3. Capsule 1-celled or by the intrusion of the placentae 3-celled. Seeds often tailed or apiculate, reticulate or ribbed, many.

Lower bracts of the inflorescence terete, erect, appearing like a continuation of the stem; inflorescence therefore apparently lateral, stamens 6.

Flowers several in a more or less compound panicle, seeds apiculate or acute; perennials with long rootstocks. I. EFFUSI.

Flowers 1-5, of which one is subsessile and the others peduncled; seeds caudate, *f. e.*, with white tails at each end, densely caespitose perennials. II. SUBTRIFLORI.

Lower bracts not appearing as a continuation of the stem, or if so, channeled on the upper side, inflorescence terminal.

Leaves neither septate nor equitant

Leaves not fistulose.

Flowers many.

Flowers bracteolate, inserted singly on the branches of the inflorescence, leaves narrowly linear, either flat or subterete and channeled, stamens 6.

Perennials, with short caespitose rootstocks, stems simple.

III. TENUES.

Annuals, stem branching; seed apiculate

IV. BUFONII.

Flowers not bracteolate, in true heads on the branches of the inflorescence, leaves flat, often grass-like, perennials with stoloniferous rootstocks

VI. GRAMINIFOLII

Flowers solitary on the scape, plant 2-3 cm high.

VII. UNCLIALES

Leaves fistulose (*f. e.*, hollow), flowers few in small heads; lower sheath bladeless; seeds caudate, stamens 6.

V. CASTANEI

Leaves septate

Leaves terete, not equitant

Septa poorly developed; heads 1-3

V. CASTANEI

Septa well developed, heads usually several (in *J. Mertenstanus* usually only one)

VIII. NODOSI

Leaves equitant, laterally flattened so that one edge is towards the stem, seeds apiculate, perennials with creeping rootstocks.

IX. ENSIFOLII

I. EFFUSI

Stem light green, striate when dry on account of the free hypodermal fibro-vascular bundles, sepals and petals green

1. *J. filiformis*

Stem dark green or at the base purplish, not striate; sepals and petals brown.

Stem terete, sheath naked or merely bristle-pointed, sepals and petals dark purplish brown

Inflorescence congested, branches 1-3 cm long; petals and sepals acute or short-acuminate, almost equal in length

2. *J. ater*.

Inflorescence open, branches 4-7 cm long; sepals long-acuminate, much exceeding the acute petals

3. *J. vallicola*.

Stem flattened, uppermost sheath often leaf-bearing, sepals and petals not very dark brown.

4. *J. mexicanus*

II. SUBTRIFLORI.

Upper sheaths merely bristle-pointed, petals and sepals with green backs and dark brown margins.

5. *J. Drummondii*.

Upper sheaths leaf-bearing; green backs of the petals and sepals less prominent

Sepals and petals linear-lanceolate, light brown, capsule acute

6. *J. Parryi*.

Sepals and petals broadly lanceolate, very dark brown; capsule retuse.

7. *J. Halhi*

III. TENUES.

Seeds long-caudate; leaves terete with a shallow groove above.

8. *J. Vaseyi*

Seeds apiculate, not caudate; leaves flat, but usually involute, lunate in section.

Auricles at the summit of the sheaths membranous, whitish.

Auricles scarcely produced beyond the insertion, scarcely scarious, petals and sepals scarcely spreading.

Perianth 3-4 mm long, equalling the capsule

9. *J. interior*

Perianth 4.5-5 mm. long, exceeding the capsule

10. *J. arizonicus*

Auricles conspicuously produced beyond the point of insertion

Capsule oblong, narrow, 3-celled, equalling the perianth or nearly so, sepals and petals erect or appressed

Stem stout, leaves short and broad (1.5-2 mm. wide), sepals and petals 4-5 mm. long, scarious at the base only, stramineous, flowers in an open cyme.

11. *J. brachyphyllus*.

Stem slender, leaves narrow and long, sepals and petals 3.5–4 mm long, scarious to the apex, fuscous, flowers few, congested.

12. *J. confusus*.
 Capsule ovate or oval, 1-celled, three-fourths as long as the petals or less; petals and sepals spreading 13. *J. tenuis*.
 Auricles cartilaginous, yellowish brown, inflorescence greenish; capsule ovate, petals and sepals spreading. 14. *J. Dudleyi*.

IV. BUFONII.

- Capsule oblong to ovoid, trigonous, 3–4.5 mm. long, at maturity closely embraced by the ascending petals 15. *J. bufonius*.
 Capsule subglobose or short-ovoid, 2–3 mm long; petals and sepals at maturity loosely spreading, ascending, or squarrose. 16. *J. sphaerocarpus*.

V. CASTANEI.

- Stem leafy only at the base, but the uppermost leaf often with a long sheath; perianth about 4 mm long, leaves about 1 mm in diameter, rootstock short, caespitose.
 Lowest bract of the inflorescence more or less membranaceous, spreading; capsule obtuse or mucronate 17. *J. triglumis*.
 Lowest bract of the inflorescence foliaceous, erect; capsule deeply retuse. 18. *J. biglumis*.
 Stem more or less leafy, leaves about 2 mm. in diameter, perianth 5–6 mm. long; rootstock longer, stoloniferous. 19. *J. castaneus*.

VI. GRAMINIFOLII.

- Seeds caudate, ligules with lanceolate, acute auricles at the summit
 Stem slender, 3–5 dm. high, leaves 5–20 cm long, auricles about 1 mm. long 20. *J. Regelii*.
 Stem about 2 dm. high, leaves 3–6 cm long, spreading, auricles of the ligules about 2 mm long 21. *J. Jonesii*.
 Seeds not caudate, ligules with rounded auricles or none.
 Leaves long, erect, auricles present 22. *J. longistylis*.
 Leaves short and broad, ascending, spreading, auricles none. 23. *J. orthophyllus*.

VII. UNCIALES.

- One species. 24. *J. uncialis*.

VIII. NODOSI.

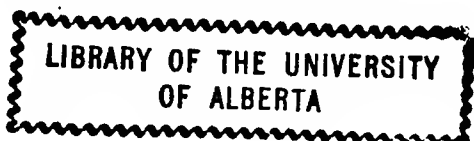
- Stamens 6, seeds not caudate, or slightly so in *J. Mertensianus* and *J. nevadensis*; perennials with creeping rootstocks.
 Inflorescence with short branches; flowers echinate-spreading or the lowest of the heads reflexed, capsule narrowly lanceolate 25. *J. nodosus*.
 Heads 7–10 mm. in diameter, leaf-blades erect, petals usually longer than the sepals.
 Heads 10–16 mm. in diameter, leaf-blades usually spreading, sepals longer than the petals 26. *J. Torreyi*.
 Inflorescence with elongated branches; flowers erect-ascending; capsule oblong.
 Capsule shorter than or rarely equalling the acuminate sepals and petals.
 Flowers dark brown
 Capsule acute 27. *J. nevadensis*.
 Capsule truncate or obtuse
 Heads several; leaves terete, seeds not caudate 28. *J. truncatus*.
 Heads solitary, or rarely 2–3; leaves somewhat flattened, seeds often caudate 29. *J. Mertensianus*.
 Flowers light brown or straw-colored. 30. *J. columbianus*.
 Capsule longer than the obtuse or acutish petals and sepals. 31. *J. Richardsonianus*.
 Stamens 3, seeds long-caudate; perennials with caespitose rootstocks 32. *J. Tweedyi*.

IX. ENSIFOLII.

- Styles long, exceeding the petals by 1 mm in length. 33. *J. Tracyi*.
 Style slightly, if at all exceeding the petals
 Flower-clusters numerous, small, 5–12-flowered, light colored 34. *J. brunnescens*.
 Flower-clusters few, 15–25-flowered.
 Flowers greenish or light brown, stamens 6, ligules of the sheaths usually without auricles 35. *J. parous*.
 Flowers fuscous or very dark brown
 Stamens 6; ligules of the sheaths usually produced into small auricles. 36. *J. saximontanus*.
 Stamens 3, ligules without auricles 37. *J. ensifolius*.

1. *J. filiformis* L. Stem 1–5 dm. high, slender, 1–2 mm. thick; leaves basal and reduced to brown sheaths; inflorescence 6–10-flowered, open; sepals 4–5 mm. long, lanceolate, acute, slightly exceeding the obtuse or acutish petals; capsule obovoid, green, about equalling the petals, 3-celled; seeds acute, but scarcely apiculate. In wet places: Greenl.—Pa.—Utah—Wash.—Alaska; Eurasia. *Plain—Submont. Je—Au.*

2. *J. ater* Rydb. Stem dark green, 2–6 dm. high, about 2 mm. thick; sheaths loose, dark brown; flowers 5–20; sepals and petals 5–6 mm. long; capsule ob-



pyramidal, long-mucronate, 3-celled. *J. balticus montanus* Engelm. Mountain valleys: Alaska—Calif.—N.M.—Neb.—Mont. *Plain—Subalp.* Jl—Au.

3. *J. vallicola* Rydb. Stem rather stout, 6–8 dm. high, terete, 2–4 mm. in diameter; sheaths at the base short, dark brown, bladeless; sepals narrowly lanceolate, slightly if at all scarious on the margins, about 6 mm. long; petals broader and shorter, with broad scarious margins, about 5 mm. long; capsules short-ovoid, obtusish and mucronate, shorter than the petals. *J. balticus vallicola* Rydb. Mountain valleys: B.C.—Wash.—Colo.—Mont. *Plain—Submont.* Je—Jl.

4. *J. mexicanus* Willd. Stem usually twisted, 3–6 dm. high; sheaths brown, short, except the uppermost, with a blade resembling the stems; inflorescence open; sepals light brown, 5–6 mm. long, lanceolate, longer than the scarious-margined petals; capsule ovate, triangular, mucronate, equalling the petals. *J. compressus* H.B.K. not Jacq. Mountains: N.M.—Utah—Calif.; Mex. *L. Son.* My—Au.

5. *J. Drummondii* E. Meyer. Stems 1–3 dm. high, slender; sheaths brown, short, striate, not inflated; blades reduced, bristle-like, 3–10 mm. (rarely 20 mm.) long; sepals lanceolate, attenuate, 7 mm. long; petals similar but usually slightly shorter; capsule oblong, triangular, obtuse, 3-celled. *J. subtriflorus* (E. Meyer) Coville. Mountain sides, especially in damp places: Alaska—Calif.—N.M.—Alta. *Mont.—Alp.* Jl—Au.

6. *J. Parryi* Engelm. Stem 1–3 dm. high, terete, slender; sheaths brown, the upper with a sulcate blade 5–6 cm. (rarely 8 cm.) long; sepals 5–7 mm. long, longer than the acute, scarious-margined petals; capsule oblong, triangular, 3-celled. Mountain sides: B.C.—Calif.—Colo.—Mont. *Mont.—Alp.* Jl—Au.

7. *J. Hallii* Engelm. Stems slender, 2–3 dm. high, terete; sheaths brown; blades of the uppermost leaves 5–15 cm. long; sepals 4–5 mm. long, exceeding the similar petals; capsule dark brown, ovate, triangular, 3-celled, fully equalling the sepals. Mountains: Colo.—Mont. *Mont.—Subalp.* Jl—Au.

8. *J. Vaseyi* Engelm. Stems tall and stiff, 3–8 dm. high, terete; leaf-blades three-fourths as long as the stem; inflorescence 1–3.5 cm. long, with erect 2–4 flowered branches; sepals and petals 3.5–4 mm. long, green or straw-colored, lanceolate, erect, acute and narrowly scarious-margined; capsule oblong-cylindric, obtuse. Moist shores and wet woods: Me.—Ida.—Colo.—Sask. *Plain—Mont.* Je—Au.

9. *J. interior* Wiegand. Stems tall, stout, 5–10 dm. high, nearly terete, coarsely grooved; leaves several, with blades one-third as long as the stem, 1–1.25 mm. wide; inflorescence large and open, 3–10 cm. long, many-flowered; sepals and petals 3–4 mm. long, nearly equal, lanceolate, very acute, narrowly scarious-margined, erect; capsule oblong, obtuse, imperfectly 3-celled. Dry woods and prairies: Ill.—Ark.—Tex.—N.M.—Wyo. *Plain—Submont.* My—Au.

10. *J. arizonicus* Wiegand. Stem 4–7 dm. high, terete, or slightly compressed, grooved; leaf-blades one-third to one-half as long as the stem, 1 mm. wide; inflorescence many-flowered, 4–7 cm. long, with erect branches; sepals and petals 5 mm. long, lance-subulate, very acute, erect; capsule ovate-oblong, obtuse, triangular above, imperfectly 3-celled. Prairies and plains: Tex.—Colo.—Ariz. *Son.—Submont.* Ap—Jl.

11. *J. brachyphyllus* Wiegand. Stem stout, 4–5 dm. high, slightly compressed, grooved; leaf-blades short, one-fourth to one-third as long as the stem, broad and flat, 1.5–2 mm. wide; inflorescence short, many-flowered, 2–6 cm. long; sepals lanceolate, very acute, straw-colored; petals similar but scarious-margined all around; capsule narrowly oblong, obtuse or retuse. Meadows: Ark.—Okla.—Ida. *Plain—Submont.* My—Jl.

12. *J. confusus* Coville. Stem slender, 4–5 dm. high, light green, slightly grooved; leaf-blades filiform, two-thirds as long as the stem or less, flat or involute; sepals and petals lanceolate, acute, straw-colored, with dark stripes on each side, scarious-margined; capsule oblong, a little shorter than the petals, retuse. *J. tenuis congestus* Engelm., in part. Meadows: B.C.—N.M.—Neb.—Sask. *Plain—Mont.* Je—Au.

13. *J. tenuis* Willd. Stem 2-6 dm. high, spreading, slightly flattened, striate; leaf-blades nearly as long as the stem, 1-1.25 mm. wide, flat, soft; inflorescence open, 1-7 cm. long, with the flowers near the end of the branches; petals and sepals 3-4.5 mm. long, lanceolate, very acute, green, with white scarious margins. Roadsides and meadows: Newf.—Fla.—Tex.—Mont.—Ore.—Wash. *Plain—Submont.* My-S.

14. *J. Dudleyi* Wiegand. Stem 3-10 dm. high, stiff, erect, strongly striate; leaf-blades half as long as the stem or less, narrow, flat or involute; inflorescence small, dense, 2-5 cm. long; sepals and petals 4-5 mm. long, lanceolate, acute, yellowish green, with scarious margins; capsule ovoid, somewhat shorter than the petals, rounded and apiculate at the apex, imperfectly 3-celled. Damp places and meadows: Me.—N.Y.—N.M.—Ariz.—Wash.—Alta.; Mex. *Plain—Submont.* My-Au.

15. *J. bufonius* L. Stem 0.5-2 dm. (seldom 3 dm.) high; leaf-blades flat, 0.25-1 mm. wide; flowers inserted singly on the branches; sepals 4-6 mm. long, narrowly lanceolate, subulate-attenuate, scarious-margined; petals somewhat shorter, less attenuate; capsule shorter than the petals, obtuse, 3-celled. Wet places: Greenl.—Fla.—Calif.—Alaska; Mex.; also Old World. *Plain—Mont.* Ap-S.

16. *J. sphaerocarpus* Nees. Stem 0.5-2 dm. high; leaf-blades 0.5 mm. or less wide; sepals 3-4 mm. long, pale, lanceolate, acuminate, slightly longer than the petals, with broader scarious margins; capsule one-half to two-thirds as long as the petals, 3-celled. Wet places: Ore.—Calif.—Colo.—Ida. *Plain—Submont.* Ap-Jl.

17. *J. triglumis* L. Stem 5-15 cm. high, erect, terete, 1 mm. or less thick; blades terete, 1-7 cm. long; sepals and petals ovate-lanceolate, obtuse, brown, about 4 mm. long; capsule cylindric, trigonous, imperfectly 3-celled. Arctic-alpine regions: Greenl.—N.Y.—N.M.—Alaska; Eurasia. *Subalp.—Alp.* Jl-Au.

18. *J. biglumis* L. Stem erect, subterete, 3-10 cm. (rarely 2 dm.) high; blades terete or nearly so, 2-7 cm. long, about 1 mm. thick; sepals and petals 3 mm. long, oblong, rounded-obtuse, fuscous, with more greenish back; capsule trigono-cylindric, retuse, imperfectly 3-celled. Arctic-alpine regions: Greenl.—B.C.—Alaska; Eurasia. *Alp.* Jl-Au.

19. *J. castaneus* J. E. Smith. Stems erect, terete, 1-3 dm. high, more or less leafy; blades channeled, 3-10 cm. long, 1-2 mm. thick; sepals linear-lanceolate, about 5 mm. long, acute, chestnut-brown; petals obtuse; capsule ovate-prismatic, trigonous, acute, imperfectly 3-celled, almost black. Arctic-alpine regions: Greenl.—Newf.—N.M.—Alaska; Eurasia. *Subalp.—Alp.* Je-Au.

20. *J. Regelii* Buch. Stem erect, terete or compressed, 2-5 dm. high, leafy, 1-2 mm. thick; blades 5-20 cm. long, 1-3 mm. wide, soft, many-nerved; inflorescence consisting of 1-3 globose, several-flowered heads; bractlets scarious, broadly ovate, cuspidate; sepals 4-5 mm. long, lanceolate, acuminate, narrowly scarious-margined; petals ovate-lanceolate, acutish, broadly scarious-margined; capsule equalling the perianth, ovate, trigonous, obtuse, dark brown above. Mountain meadows: B.C.—Wash.—Utah.—Mont. *Mont.—Subalp.* Jl-Au.

21. *J. Jonesii* Rydb. Stem about 2 dm. high, terete; leaf-blades 3-5 cm. long, about 2 mm. wide, spreading; inflorescence capitate, or rarely with a second head; sepals lanceolate, 5-6 mm. long, acute or cuspidate, green on the back, brown on the sides, and with narrow scarious margins; petals ovate or ovate-lanceolate, with broad margins; capsule dark brown, ellipsoid, retuse and apiculate. Mountain meadows: Utah. *Mont.* Au.

22. *J. longistylis* Torr. Stem erect, slender, compressed, 3-5 cm. high, 1-1.5 mm. thick; leaf-blades 1-2 mm. wide, 5-10 cm. long; inflorescence of 1-6 heads; heads 5-12-flowered; sepals as in the preceding; petals broader, more obtuse and with broader margins; capsule shorter than the perianth, oblong, brown, trigonous above, obtuse. Meadows: Alta.—S.D.—N.M.—Calif.—Ore.; Mex. *Plain—Mont.* Je-Au.

23. *J. orthophyllus* Coville. Stem erect, 2.5–3 dm. high, compressed, 1–1.5 mm. thick; leaf-blades 5–10 cm. long, flat, 4–5 mm. broad, many-nerved, those of the stem-leaves narrower; inflorescence of 2–6 heads; heads 8–10-flowered; sepals as in the preceding; petals broader, acutish, with broad margins; capsule slightly shorter than the petals, oblong, trigonous, obtuse, mucronate, imperfectly 3-celled. *J. longistylus latifolius* Engelm. Mountains: Wash.—Calif.—Utah. *Plain—Submont.* My—Au.

24. *J. uncialis* Greene. Annual, 2–3 cm. high, branched near the base, glabrous; leaves basal, flat, somewhat fleshy, linear, acute, 3–8 mm. long; scapes 1-flowered, with a single minute bract; sepals and petals oblong-lanceolate, acute, hyaline, with a purplish or greenish midrib, about 1.5 mm. long; capsule obtuse, slightly shorter; seeds apiculate. (?) *J. triflorus uniflorus* Engelm. Wet places: Wash.—Utah—Calif. *Plain—Submont.* Je—Jl.

25. *J. nodosus* L. Stem 1.5–6 dm. high, erect, terete or somewhat compressed, leafy; leaf-blades erect, 0.5–1 mm. thick, terete, 5–15 cm. long, septate; heads 1–30, 8–20-flowered; sepals 2.5–3.5 mm. long, lanceolate, subulate; petals similar but slightly longer; capsule lanceolate-subulate, 3-gonous, 1-celled, straw-colored, exceeding the perianth. Wet soil: N.S.—Va.—N.M.—Nev.—B.C.—Mack. *Plain—Submont.* Jl—S.

26. *J. Torreyi* Coville. Stem stout, 3–9 dm. high, 2–4 mm. thick, leafy; leaf-blades 1–3 mm. thick, terete, septate; heads 1–20, congested, 30–80-flowered; sepals and petals lance-subulate, about 5 mm. long; capsule subulate, 3-gonous, 1-celled. *J. nodosus megacephalus* Torr. Wet places, especially in sandy soil: w N.Y.—Miss.—Calif. *Plain—Mont.* Jl—S.

27. *J. nevadensis* S. Wats. Stem slender, erect, somewhat compressed, 2–4 dm. high, about 1 mm. thick; leaf-blades nearly terete, 0.5–1.5 mm. thick, septate; heads 2–11, 3–10-flowered; petals and sepals lanceolate, acute or mucronate, dark brown, with membranous margins; capsule slightly shorter than the perianth, brown above, acute. *J. phaecephalus gracilis* Engelm. In meadows: B.C.—Calif.—Wyo.—(?) Colo.—Mont. *Submont.—Mont.* Je—S.

28. *J. truncatus* Rydb. Stems slender, 3–5 dm. high, terete or slightly flattened; leaves 1–3 dm. long, 1–2 mm. thick, septate; inflorescence open, 2–5 cm. long, irregularly cymose, with 4–10 heads; heads 6–9 mm. in diameter, 5–10-flowered; petals and sepals lanceolate, dark brown, about 3 mm. long, acuminate, longer than the capsule. *J. alpinus insignis* Coult., in part. *J. Mertensianus* Auth., not Engelm. (?) *J. badus* Suskd. Mountain meadows: N.M.—Wyo.—Ida. *Submont.—Mont.* Je—Au.

29. *J. Mertensianus* Bong. Stem erect, slender, 1–3 dm. high, 1–1.5 mm. thick; leaf-blades about 1 mm. thick; inflorescence capitate, rarely with 2–3 heads; head 10–12 mm. thick, 10–25-flowered; sepals and petals lanceolate, acute, almost black, the latter distinctly scarious-margined; capsule scarcely equalling the perianth, 3-gonous, obovate, 1-celled, dark brown above. Wet meadows. Alaska—Calif.—N.M.—Alta. *Mont.—Subalp.* Jl—Au.

30. *J. columbianus* Coville. Stem 2–7 dm. high, terete, 1.5–2 mm. thick; leaf-blades terete, 1–2 dm. long, inconspicuously septate, erect; inflorescence of 4–8 (rarely up to 20) heads; sepals and petals lanceolate, cuspidate, straw-colored or brownish, 3–3.5 mm. long; capsule equalling the perianth or a little shorter, oblong, acute or beaked. Meadows: Wash.—Ore.—Mont. *Submont.* My—Jl.

31. *J. Richardsonianus* Sehult. Stem erect, 1.5–5 dm. high; blades terete or slightly compressed, septate, 0.5–1 mm. thick; inflorescence with 5–25 heads, which are 4–6 mm. thick, 3–12-flowered; sepals 2–2.5 mm. long, pale greenish, acutish; petals oblong, acute; capsule ovoid-oblong, slightly exceeding the perianth. *J. alpinus insignis* Fries. In wet soil: N.S.—Pa.—Neb.—Wash.—Alaska. *Plain—Mont.* Jl—S.

32. *J. Tweedyi* Rydb. Stem strict, about 3 dm. high, light green, 2–3 mm. thick; leaf-blades about 1 dm. long, terete or somewhat flattened, septate; inflorescence of 4–10 heads in a contracted panicle; heads 5–8-flowered; sepals and

petals 4 mm. long, lanceolate, acute or acuminate, light brown; capsule dark brown, oblong, acute, 3-angled, about one-fourth longer than the perianth. *J. canadensis coarctatus* Coulter, not Engelm. *J. canadensis Kuntzei* Buch. Bogs and wet meadows: Mont.—Wyo.—Utah. *Submont.*—Mont. Jl.

33. *J. Tracyi* Rydb. Stem stout, 3-6 dm. high, compressed; blades 5-20 cm long, 2-4 mm. wide; sheaths with a scarious margin which usually is produced into a very short auricle; inflorescence of 5-9 heads; these about 1 cm. in diameter; sepals and petals lanceolate, acute, light brown, 3-4 mm. long, slightly scarious-margined; capsule oblong, mucronate, shorter than the perianth, imperfectly 3-celled. Meadows: Utah—Nev.—Ida. *Submont.* Jl—O.

34. *J. brunnescens* Rydb. Stem 4-6 dm. high, more or less winged; leaves 1-2.5 dm. long, 2-5 mm. wide; sheaths with scarious margins, abruptly contracted above, but scarcely auricled; panicle open, 5-10 cm. long, with 10-60 small heads; petals and sepals subequal, lanceolate, acuminate, about 3 mm. long, light brown, with green midrib; capsule lance-ovoid, acute. Mountain meadows: Colo.—N.M.—Ariz.—Nev. *Submont.* Je—Jl.

35. *J. parous* Rydb. Stem 3-6 dm. high, distinctly winged; leaves 2-3 dm. long, 3-5 mm. wide; petals and sepals lanceolate, sharply acuminate, subequal, light brown or greenish on the back; capsule oblong, acute, shorter than the petals. Mountain meadows: Colo.—N.M.* *Submont.*—*Subalp.* Je—Jl.

36. *J. saximontanus* A. Nels. Stem winged, 2-5 dm. high; leaf-blades 3-20 cm. long, 2-4 mm. wide; inflorescence of 2-15 heads; these about 1 cm. thick; sepals and petals lanceolate, acuminate, about 3 mm. long, dark brown; capsule oblong, mucronate, a little shorter than the perianth, dark brown. *J. xiphioides montanus* Engelm. Meadows and wet places: B.C.—Calif.—N.M.—Alta. *Submont.*—Mont. Je—S.

37. *J. ensifolius* Wikstr. Stem erect, 3-6 dm. high, winged; leaf-blades more or less falcate, 5-30 cm. long, 3-6 mm. wide; heads about 1 cm. thick, about 25-flowered; sepals and petals dark brown, lanceolate, acuminate, about 3 mm. long; capsule oblong, acute, often slightly exceeding the perianth, 3-gonous. *J. xiphiodes triandrus* Engelm. Meadows and wet places: Alaska—Calif—Utah—Alta. *Submont.* Je—Au.

2. JUNCOIDES (Dill.) Adans. WOOD-RUSH.

Perennial caulescent herbs, with rootstocks, glabrous or sparingly pubescent. Leaf-sheaths closed; blades grass-like. Inflorescence umbel-like, capitate or spike-like. Flowers always subtended by usually lacerate or dentate bractlets. Stamens 6. Capsule 1-celled; ovules and seeds 3, basal. Seeds reticulate, sometimes apiculate but never tailed. [*Luzula* DC.]

Flowers on slender pedicels in a corymbiform inflorescence.

Petals and sepals 1.5-2 mm long

Flowers and capsule pale green, leaves thin, shining; seeds brown, ellipsoid.

Flowers and capsule dark brown, leaves thick, dull, seeds yellow, constricted at each end.

Petals and sepals 3-3.5 mm. long

Flowers subsessile in head-like or spike-like clusters.

Blades at least of the lower leaves flat, not attenuate into a subulate tip.

Spikelets peduncled, forming a corymb.

Flowers light yellow.

Flowers brown or ferruginous.

Spikelets subsessile, forming a compound spike

Plant tall, 4-5 dm. high, inflorescence subcapitate, stem-leaves broad and flat; bractlets not ciliate

Plant 1-2, dm. rarely 4 dm high

Bractlets ciliate; spike usually elongate and often nodding; stem-leaves narrow, attenuate.

Bractlets lacerate, not ciliate, spike short, capitate

Blades of the leaves attenuate into subulate, almost pungent tips

Spikelets many-flowered, the lower on suberect or ascending peduncles; leaves erect.

Spikelets few-flowered on arcuate-spreading peduncles, leaves arcuate-spreading.

1. *J. parviflorum*.

2. *J. Pipert*.

3. *J. glabratum*.

4. *J. comosum*.

5. *J. intermedium*.

6. *J. subcapitatum*.

7. *J. spicatum*.

8. *J. arcticum*.

9. *J. hyperboreum*.

10. *J. arcuatum*.

1. *J. parviflorum* (Ehrh.) Coville. Stem erect, terete, 3-5 dm. high; leaf-blades broadly linear, 5-15 cm. long, 5-12 mm. wide, glabrous except the mouth of the sheath; flowers singly or rarely 2 or 3 together; sepals and petals lanceolate or ovate-lanceolate, acute; capsule ovate, 3-gonous, obtuse, exerted. *Luzula spadicea parviflora* E. Meyer. Meadows, hillsides, and thickets: Greenl.—N.Y.—N.M.—Calif.—Alaska; Eurasia. *Mont.*—*Subalp.* My-S.

2. *J. Piperi* Coville. Stem erect, 1-3.5 dm. high; leaves mostly basal, lance-linear, 2-4 mm. wide, glabrous except a few long hairs on the sheaths and margins; inflorescence 5-8 cm. long, nodding, diffuse; flowers solitary on the branches, rarely 2 or 3 together; sepals and petals about 1.5 mm. long, ovate, acuminate; capsule ovate, acute, exerted. Sandy moraines: Wash.—Mont.—Ore. *Alp.*—*Subalp.* Jl-S.

3. *J. glabratum* (Hoppe) Sheld. Stems erect or ascending, terete, 2-5 dm. high; leaf-blades broadly linear to lanceolate, 3-10 cm. long, 4-10 mm. wide, glabrous; inflorescence open, ovoid, with branches often divaricate; flowers mostly singly; sepals and petals dark brown, lanceolate, acute; capsule almost black, ovate, acute, equalling the perianth. *Luzula glabrata* (Hoppe) Desv. Hillsides and mountains: Alaska—Wash.—Ida.—Mont.; Eu. *Mont.*—*Subalp.* Jl-Au.

4. *J. comosum* (E. Meyer) Sheld. Stem erect or ascending, 1-4 dm. high; leaves numerous, pale green; blades linear, 3-10 cm. long, 3-6 mm. wide, glabrous; heads oblong, 6-7 mm. thick; sepals and petals lanceolate, yellowish brown, acuminate, about 3 mm. long, slightly exceeding the ellipsoid or subglobose capsule. *L. comosa* E. Meyer. Woods and copses: Alaska—Calif.—Colo.—Mont. *Submont.*—*Mont.* My-Jl.

5. *J. intermedium* (Thuill.) Rydb. Stem slender, 2-5 dm. high; leaf-blades 5-10 cm. long, 1-4 mm. wide; inflorescence with erect or strongly ascending branches; heads 4-10, globose or oval, about 6 mm. thick, 8-16-flowered; sepals and petals 2.5-3 mm. long, lanceolate, mucronate, brown or reddish, with paler margins; capsule obovate, 3-gonous, obtuse or retuse, nearly equalling the perianth. *L. campestris multiflora* Celak. Hills and mountains: Greenl.—N.Y.—N.M.—Calif.—B.C. *Submont.*—*Mont.* Je-Au.

6. *J. subcapitatum* Rydb. Stem 3-4 dm. high, glabrous; leaf-blades lanceolate, acuminate, glabrous, 4-10 cm. long, 5-10 mm. wide; inflorescence compact, consisting of 6-10 heads, conglomerate and forming an irregular head; sepals and petals subequal, 1.5-2 mm. long, ovate, acuminate, dark brown, but lighter on the midrib; capsule broadly obovoid, obtuse, shorter than the petals. Mountains: Silver Plume, Colo. *Subalp.* Au.

7. *J. spicatum* (L.) Kuntze. Stem 1-3 dm. high, erect; leaf-blades 4-6 cm. (rarely up to 12 cm.) long, 1-3 mm. wide; in florescence spike-like, usually nodding; sepals and petals 2-3 mm. long, lanceolate, aristate-acuminate; capsule broadly ovoid, acute, about two-thirds as long as the perianth. *L. spicata* DC Hills and mountain sides: Greenl.—N.H.—N.M.—Calif.—Alaska; Eurasia *Mont.*—*Alp.* Jl-Au.

8. *J. arcticum* (Blytt) Coville. Stem erect, 5-10 cm. high, terete, slender, leaf-blades glabrous, 3-5 cm. long, 2-4 mm. wide; inflorescence spicate, erect, small; sepals and petals 1.5-2 mm. long, lanceolate, fuscous; capsule ovate, 3-gonous, exceeding the perianth. *J. nivalis* Coville, not *L. nivalis* Laest *L. arctica* Blyth. *L. hyperborea minor* Hook. Arctic-alpine regions: Greenl.—Canadian Rockies—Alaska; Scandinavia and Spitzbergen. *Alp.* Jl-Au.

9. *J. hyperboreum* (R. Br.) Sheld. Stem 1-2 dm. high, erect; leaf-blades narrow, 5-10 cm. long, 1-2 mm. wide; inflorescence of a single erect head, or if heads 2-3, the lowest erect and the upper sometimes nodding; sepals and petals lanceolate, acute, brown, 2-2.5 mm. long; capsule about three-fourths as long as the perianth, 3-gonous, globose or ovate. *L. hyperborea* R. Br. Alpine-arctic regions: Greenl.—N.H.—Canadian Rockies—Alaska; Eu. *Alp.* Jl-Au.

10. *J. arcuatum* (Wahl.) Kuntze. Stem slender, about 1 dm. high; leaf-blades 3-8 cm. long, narrow, 1-1.5 mm. wide, often curved; inflorescence of 2-10

(rarely more) heads; the lower on slender curved peduncles; heads small, 3-5 mm. thick; sepals and petals elongated-lanceolate, about 2.5 mm. long, dark brown; capsule 3-gonous, globose, mucronate, shorter than the perianth. Arctic-alpine regions: Greenl.—Canadian Rockies—B.C.—Alaska; Eurasia. *Alp.* Jl—Au.

Family 20. **ALLIACEAE.** ONION FAMILY.

Perennial scapose herbs, with bulbs or corms and narrow basal leaves. Flowers in terminal umbels subtended by or enveloped in a scarious involucre. Sepals and petals each 3, very similar, corolla-like, usually membranous. Stamens 6. Pistil of 3 united carpels; ovary superior, 3-celled; styles united. Fruit a loculicidal, 3-celled capsule.

Perianth-segments distinct or nearly so; style articulate to the 3-lobed capsule, bracts broad, spathaceous. 1. **ALLIUM.**

Perianth-segments united into a tube, with adnate filaments; style not articulate to the capsule, bracts not spathaceous, distinct. 2. **DIPTEROSTEMON.**

Filaments not united into a tube; pedicels articulate; capsule ovate or oblong.

Filaments apparently in one series.

Filaments opposite to the petals wing-appendaged at the base; anthers basifixed, flowers subcapitate. 3. **HESPEROSCORDION.**

Filaments all deltoid, anthers versatile, flowers umbellate. 4. **TRITILEIA.**

Filaments in two series, the inner adnate to the free part of the petals; anthers versatile. 5. **ANDROSTEPHIUM.**

Filaments united into a tube; pedicels not articulate; capsule triquetrous, subglobose.

1. **ALLIUM** (Tourn.) L. ONION, GARLIC, LEEK, CHIVES.

Perennial bulbous plants, with a characteristic alliaceous smell. Bracts scarious, more or less connate. Petals and sepals free or slightly united at the base. Stamens adnate to the bases of the petals and sepals; anthers introrse. Ovary sessile, 3-celled; style filiform, usually deciduous; stigmas minute; ovules 1-6 in each cell.

Bulb crowning a persistent rootstock; outer coat more or less fibrous.

Leaves terete and hollow, umbels dense, subcapitate. 1. *A. sibiricum.*

Leaves flat or channeled, not hollow.

Umbels rarely nodding; petals and sepals long-acuminate; capsule not crested. 2. *A. validum.*

Stamens and styles exerted.

Stamens and styles included, half as long as the petals. 3. *A. brevistylum.*

Umbels nodding, petals and sepals obtuse or acute; capsule 6-crested; stamens and style exerted.

Leaves rounded-convex on the back, not keeled, lunate in cross-section. 4. *A. recurvatum.*

Leaves almost flat or keeled, somewhat broadly V-shaped in cross-section.

Umbels many-flowered; leaves 3-5 mm. wide. 5. *A. cernuum.*

Umbels few-flowered; leaves less than 3 mm. wide. 6. *A. neo-mexicanum.*

Bulbs without a rootstock.

Outer bulb-coat fibrous.

Umbels bulblet-bearing; flowers few or sometimes none.

Capsule with 6 rounded crests. 7. *A. fibrosum.*

Capsule not crested.

Petals and sepals ovate. 8. *A. rubrum.*

Petals and sepals oblong-lanceolate. 9. *A. canadense.*

Umbels not bulblet-bearing.

Capsule not crested, involucre usually 3-leaved.

Petals and sepals with a thick rounded keel. 10. *A. aridum.*

Petals and sepals not thickened on the back. 11. *A. Nuttallii.*

Capsule crested.

Petals and sepals more than 1 cm. long; peduncles often 2 or 3; sheaths loose; bracts 3. 12. *A. macropetalum.*

Petals and sepals less than 1 cm. long; peduncles solitary; sheaths close.

Bracts broadly ovate, usually 2, in flowers not reflexed; flowers white or light rose; several layers of the bulb-coat fibrous.

Plant 1-3 dm. high; pedicels 8-12 mm. long; petals and sepals about 5 mm. long. 13. *A. textile.*

Plant 2-6 dm. high; pedicels 12-25 mm. long; petals and sepals 6-8 mm. long. 14. *A. Geyeri.*

Bracts lanceolate, usually 3, soon reflexed; only outer bulb-coat fibrous; flowers red-purple. 15. *A. Pikeanum.*

Outer bulb-coat not fibrous, but often more or less reticulate.

Petals more or less serrulate or denticulate on the margins.

Petals and sepals acuminate, the former serrulate near the apex.

Petals and sepals long-acuminate, one-half longer than the stamens. 16. *A. acuminatum.*

- Petals and sepals abruptly acuminate, only slightly longer than the stamens. 17. *A. cuspidatum*.
- Petals and sepals obtuse, delicately denticulate below with spreading papillae. 18. *A. simulilimum*.
- Petals entire, neither serrulate nor denticulate.
- Ovary and capsule crestless or indistinctly 3-crested
- Petals and sepals obtuse or barely acutish. 18. *A. simulilimum*
- Leaves much longer than the scape. 19. *A. scilloides*
- Leaves shorter than the scape.
- Petals and sepals acute or acuminate. 20. *A. incisum*
- Stamens exerted.
- Stamens included.
- Reticulations of the bulb-coat irregular, narrow, with curved sides, the outer coat in age becoming fimbriate. 20. *A. fibrillum*
- Reticulations of the bulb-coat trapezoid, or elongated pent- or hexagonal, the sides not strongly curved, no fimbriae
- Sepals and petals neither gibbous at the base, nor keeled on the back
- Involucres 3-leaved; petals and sepals little exceeding the stamens. 22. *A. tribracteatum*
- Involucres 2-leaved, petals and sepals at least half longer than the stamens
- Petals and sepals half longer than the stamens; pedicels 8-15 mm long. 23. *A. Diehlii*
- Petals and sepals twice as long as the stamens, pedicels about 4 mm long. 24. *A. minimum*
- Sepals and petals gibbous at the base and more or less keeled on the back below.
- Scape flattened, leaf-blades 5-8 mm wide.
- Scape much exceeding the leaves in length; stamens about equalling the petals and sepals. 25. *A. Douglassii*
- Scape low, often exceeded by the leaves; stamens much shorter than the petals and sepals
- Stamens two-thirds as long as the sepals, capsule scarcely crested. 26. *A. Tolmiei*
- Stamens half as long as the sepals, capsules with 3 small crests. 27. *A. Cusickii*
- Scape not flattened, leaf-blades 2-4 mm. wide
- Petals about twice as long as the stamens, capsule not crested. 28. *A. Brandegei*
- Petals barely exceeding the stamens, capsule with minute thick crests. 29. *A. Nutt.*
- Ovary and capsule distinctly 6-crested
- Stamens and styles exerted, petals and sepals acute or obtuse. 30. *A. stellatum*.
- Stamens and styles not exerted, petals and sepals acuminate.
- Leaves more than one.
- Reticulations of the bulb-coats sinuate; leaves shorter than the scape
- Bulb-coat thin, faintly reticulate, leaves 4-10 mm wide. 31. *A. bisectum*.
- Bulb-coat thick, strongly reticulate; leaves 1-3 mm. wide. 32. *A. Palmeri*.
- Reticulations of the bulb-coats straight, leaves longer than the scapes. 33. *A. pteranthum*.
- Leaves solitary, longer than the scape
- Petals and sepals long-acuminate, nearly twice as long as the stamens. 34. *A. cristatum*
- Petals and sepals acute or short-acuminate, slightly longer than the stamens. 35. *A. nevadense*.
1. *A. sibiricum* L. Bulb small, oblong-ovoid, often oblique, about 1 cm. thick; scapes 3-6 dm. high; leaf-blades 6-20 cm. long; bracts usually 2, ovate, about 2 cm. long; petals and sepals bright rose-colored, with dark midrib, fully 1 cm. long, lanceolate, acuminate; stamens included; capsule not crested. Rich soil: Me.—N.Y.—Colo.—Ore.—Alaska; Asia. Plain—Mont. Je—Au.
2. *A. validum* S. Wats. Bulb 2-4 cm. thick; scape 3-7 dm. high, stout; leaves 2-4 dm. long, 4-12 mm. wide; bracts 2-4, ovate, about 1.5 cm. long, sepals and petals dark rose-colored, 7-8 mm. long; capsule subglobose. Meadows: Wash.—Ida.—Nev.—Calif. Mont. Jl—Au.
3. *A. brevistylum* S. Wats. Bulbs obliquely elongate, lance-ovoid, 1-3 cm. thick; scape 3-6 dm. high, stout; leaf-blades 1.5-3 dm. long, 4-6 mm. wide, flat; bracts usually solitary, ovate, 1.5-2 cm. long; sepals and petals dark rose, lanceolate, 8-10 mm. long. Rich meadows and open woods: Mont.—Colo.—Utah. Submont.—Subalp. Je—Au.

4. *A. recurvatum* Rydb. Bulb oblong-ovoid, 1-1.5 cm. thick; scape slender, 3-5 dm. high, almost terete; leaf-blades 1-2 dm. long, 1-3 mm. wide, thick; involucre 2-leaved, almost 2 cm. long; petals and sepals elliptic-ovate, obtuse, 5 mm. long, rose, with darker midvein. *A. cernuum obtusum* Cockerell. Dry hills and mountain-sides. Alta.—S.D.—N.M.—B.C. Plain—Mont. My—Au.

5. *A. cernuum* Roth. Bulb lance-ovoid, 1-2 cm. thick, often purplish; scape 3-6 dm. high, stout; leaf-blades 1-2 dm. long, 3-7 mm. wide, rather thin; involucre 2-leaved, rarely more than 1 cm. long; petals and sepals light pink or white, with faint midrib, otherwise as in the preceding. On banks and hillsides: N.Y.—W.Va.—Colo.—Wash.—Sask. Plain—Submont. Je—Au.

6. *A. neomexicanum* Rydb. Bulb oblong-ovoid, 1-2 cm. thick; coats membranous, only the outer slightly fibrous; scape 3-4 dm. high, slender, terete; leaf-blades narrow, 1-2 mm. wide, almost flat, slightly keeled; involucre very small, scarcely more than 5 mm. long; petals and sepals oblong-ovate, nearly white, with very faint midrib. Dry mountains: s. Colo.—N.M.—Ariz. Submont. Au—O.

7. *A. fibrosum* Rydb. Bulb ovoid, about 1.5 cm. thick; scape 2-3 dm. high, striate, slender; leaf-blades flat, thick, 3 mm. wide, 1-1.5 dm. long; bracts 2, ovate, about 1 cm. long; petals and sepals lance-oblong, obtuse, 6 mm. long. *A. Geyeri* M. E. Jones, not S. Wats. Mountain sides and meadows: Mont.—Wyo.—Ida.—(? B.C.) Submont—Mont. Je—Jl.

8. *A. rubrum* Osterhout. Bulb ovoid, 1.5-2 cm. thick; scape 2-3 dm. high, terete; leaf-blades 7 mm. wide or less, concave; involucre 3-leaved; petals and sepals ovate, obtuse, 6-7 mm. long, with strong midrib; stamens and styles equalling the petals. In pastures and meadows: Colo.—s. Wyo. Submont. My—Jl.

9. *A. canadense* L. Bulbs ovoid, 1-2 cm. thick; scape 2-6 dm. high, stout; leaf-blades 1-5 dm. long, 3-8 mm. wide, rounded on the back; involucre 2- or 3-leaved, petals and sepals obtuse, pink or white, 4-6 mm. long; filaments as long as the petals. In meadows and fields: Me.—Fla.—La.—Colo.—Minn. Plain. My—Je.

10. *A. aridum* Rydb. Bulbs ovoid, about 1 cm. thick, usually 2-4 together; scape 1-1.5 dm. high, slender, striate, leaf-blades about 1-1.5 dm. long, often equalling or surpassing the scape, about 2 mm. wide, channeled; bracts ovate, 1 cm. long or less; sepals and petals about 6 mm. long, lance-ovate, acute; filaments and style shorter than the petals. Dry hills in hard clay: Wyo. Plain. Je—Jl.

11. *A. Nuttallii* S. Wats. Bulb solitary, ovoid, about 1.5 cm. thick; scape 1-3 dm. high; leaves 2-3 mm. wide, 1-1.5 dm. long; bracts 1-1.5 cm. long; petals and sepals ovate or ovate-lanceolate, acute or acuminate, rose or white, 4-6 mm. long; stamens shorter than the petals. Plains and prairies: S.D.—Kans.—Ariz.—Ida. Plain. My—Je.

12. *A. macropetalum* Rydb. Bulb ovoid, solitary, about 2 cm. thick; leaf-blades about 2 dm. long, almost equalling the scapes, 2-4 mm. wide; scapes 2 dm. high or more, stout, 3-4 mm. thick; bracts about 2 cm. long; petals and sepals lanceolate, long-attenuate, white, with a purple or pink midrib; capsule with 6 conspicuous oblong crests. Mountains: Colo.—N.M. Submont. Ap—My.

13. *A. textile* Nels. & Macb. Bulbs usually solitary, ovoid, 1-2 cm. thick; scape slender, terete, 1-3 dm. high; leaf-blades 2-4 mm. wide, 1-1.5 dm. long; bracts fully 1 cm. long; petals and sepals ovate-lanceolate, acute or acuminate, 4-6 mm. long; capsule with 6 small rounded crests. *A. reticulatum* Fraser, not Presl. Plains and dry hills: Sask.—N.M.—Ariz.—Alta. Plain—Submont. Ap—S.

14. *A. Geyeri* S. Wats. Bulbs usually solitary, ovoid, 1.5-2.5 cm. thick; scape 3-6 dm. high, rather stout; leaf-blades 2-4 mm. wide, 1-2 dm. long; bracts 1.5 cm. long or more; petals and sepals pink or white, ovate-lanceolate, acuminate,

6-8 mm. long; capsule with 6 rather prominent crests. *A. reticulatum deserticola* M. E. Jones. *A. deserticola* Woot. & Standl. *A. dictyotum* Greene. Plains and valleys: Wash.—Ariz.—N.M.—S.D.—Mont. *Plain—Mont.* My-S.

15. *A. Pikeanum* Rydb. Bulb obliquely ovoid, about 1.5 cm. long and 8-10 mm. thick; scape 8-15 cm. long, almost equalled by the narrowly linear leaves; bracts 8-10 mm. long; petals and sepals subequal, ovate, acuminate, red-purple; capsule slightly crested above. Mountains: Pike's Peak and vicinity, Colo. *Subalp.—Alp.* Jl-Au.

16. *A. acuminatum* Hook. Bulbs solitary, nearly spherical, 1-1.5 cm. thick; outer coat rather thick, pitted, the 4-6-angled reticulations being very thick and raised; scapes 1-3 dm. high; bracts 2, 1-1.5 cm. long; flowers 12-30; sepals dark rose or reddish purple, ovate-lanceolate, keeled on the back and gibbous at the base, 8-12 mm. long; petals similar but slightly shorter. Rich soil, prairies and rocky hillsides: B.C.—Calif.—Ariz.—Colo.—Mont. *Submont.* My-Jl.

17. *A. cuspidatum* (Fern.) Rydb. Bulb solitary, nearly globose, 1.5-2 cm. thick; outer coat thick; reticulations similar to those of the preceding, but less prominent; scape 2-3 dm. high, slender; leaf-blades less than 1 dm. long, 2 mm. wide or less; sepals and petals more oblong and abruptly acuminate than in the preceding. *A. acuminatum cuspidatum* Fern. Rocky hillsides: e Wash.—w Ida. *Submont.* Ap-Jl.

18. *A. simillimum* Henderson. Bulbs ovate, nearly 1 cm. thick; reticulations of the coat rectangular-hexagonal; scape 2.5-3 cm. high, flattened and winged; leaf-blades 2, 8-9 cm. long, 1 mm. wide, falcate; bracts 2; flowers 6-9; sepals and petals narrowly oblong, pinkish white, with a strong green midvein; ovary slightly 3-crested. Open loose soil among rocks: Ida. *Mont.* Jl.

19. *A. scillioides* Dougl. Bulb globose, about 1 cm. thick, dark purplish brown; coat thin; reticulations fine and rectangular or square; scape about 2 dm. high; bracts 2, lanceolate, acuminate, fully 1 cm. long; leaves 1 or 2, about 15 cm. long, 2 mm. wide; sepals and petals ovate, about 7 mm. long; the former saccate at base; capsule slightly 3-ridged at the apex. Dry grounds: B.C.—Ida.—Ore. *Submont.* Je-Au.

20. *A. incisum* Nels. & Macb. Bulb 1-1.5 cm. thick; outer coat brown or pinkish, obscurely reticulate; scape 5-8 cm. high, 1.5-2.5 mm. broad, narrowly winged; leaves 3-5 mm. wide, slightly falcate, exceeding the scape; bracts 2-several or the bracts cleft to the base; flowers many; pedicels 1-2 cm. long; petals and sepals white, narrowly lanceolate, acute; capsule very obscurely crested. Barren clayey ground: Ida. *Jc.*

21. *A. fibrillum* M. E. Jones. Bulb nearly spherical, 1-1.5 cm. thick; leaves 2 or 3, 1-1.5 dm. long, 2-4 mm. wide; bracts 2, ovate, fully 1 cm. long; sepals ovate, acute, 6-8 mm. long; petals narrower, lanceolate; capsule slightly ridged. *A. collinum* Dougl., not Guss. Mountains: Wash.—Ore.—Ida.—w Mont. *Plain—Mont.* Je-Au.

22. *A. tribracteatum* Torr. Bulb ovoid or nearly globose, about 1 cm. thick; reticulations transversely rectangular; scape 3-5 cm. high, surpassed by the leaves; leaf-blades usually 2, 4-10 cm. long, 2-6 mm. wide; sepals and petals oblong, acutish, with a purple midrib; capsule not crested. Mountains: Ore.—Calif.—Utah—(? Colo.) *Son.* Ap.

23. *A. Diehlii* M. E. Jones. Bulb nearly globose; outer coat dark red; reticulations rectangular to linear-rectangular; scapes 5-7 cm. high; leaves 2; blades 1-1.5 dm. long and about 4 mm. wide; bracts about 12 mm. long; sepals ovate-lanceolate, acuminate; petals narrower; capsule spongy- and sulcate-crested, the crests not evident in fruit. *A. tribracteatum Diehlii* M. E. Jones. Mountains: Utah. *Mont.* My.

24. *A. minimum* M. E. Jones. Bulb small, ovate, about 8 mm. thick; outer coat very thin and membranous, the inner red; reticulations irregularly rectangular; scapes 7-10 cm. high; leaves 2; bracts 6 mm. long; flowers about 10; sepals and petals ovate, barely acute, 4 mm. long, white, with green ribs

below; capsule depressed-globose, crestless. Summits: Cuddy Mountains, Ida. Alp. Jl.

25. *A. Douglasii* Hook. Bulb ovoid, 1.5–2 cm. thick; coats thin; reticulations obsolete; scape about 3 dm. high; bracts 2, ovate, acuminate, 1.5–2 cm. long; leaf-blades 1–1.5 dm. long, falcate; sepals and petals rose-colored, 6–8 mm. long, lanceolate, acuminate; capsule not crested. *A. Hendersonii* Robins. & Seat. Hillsides and clay-banks. Wash.—Ore.—Ida. *Submont.* Je.

26. *A. Tolmiei* Baker. Bulb ovoid, about 2 cm. thick or less; reticulations obsolete; scape 5–10 cm. high; leaf-blades 2, 1–1.5 dm. long, 4–8 mm. wide; bracts 2, nearly 2 cm. long; flowers 20–30; sepals and petals pink with darker veins, about 8 mm. long, lanceolate, acute or acuminate. *A. anceps aberrans* M. E. Jones. Arid places: Wash.—Ida.—Utah. *Plain—Submont.* Ap–Je.

27. *A. Cusickii* S. Wats. Bulb rounded-ovate, 1–1.5 cm. thick; reticulations faint, rectangular; scape 5–10 cm. high; leaves 2, blades 1–1.5 dm. long, 4–7 mm. wide; bracts ovate, acuminate; flowers rather many; sepals and petals pink, with darker veins, long-attenuate, 6–10 mm. long. Valleys and mountain sides: Ore.—Ida. *Plain—Mont.* My–Jl.

28. *A. Brandegei* S. Wats. Bulb globose-ovoid, about 1 cm. thick; outer coat very thin, inner ones purplish; reticulations transversely rectangular; scape less than 1 dm. high, often surpassed by the leaves; leaf-blades 2, about 1 dm. long; bracts 2; sepals and petals rose-colored, broadly lanceolate, acuminate, 6–8 mm. long. Mountains: Ore.—Utah—Colo.—Ida. *Submont.—Mont.* Je–Au.

29. *A. Nivii* S. Wats. Bulb globose; coat white or reddish; reticulations transversely rectangular; scape 1.5–2 cm. high, longer than the leaves; leaf-blades narrow; bracts 2; sepals and petals light rose-colored, lanceolate, acuminate, 6 mm. long. Arid places: Wash.—Ida.—Ore. *Submont.* Je–Jl.

30. *A. stellatum* Ker. Bulb ovoid, 1–2 cm. thick; coats thin, mostly reddish; reticulations fine and close, elongated-rectangular; scapes 2–5 dm. high; leaves several; blades 1–3 dm. long, 1.5–2.5 mm. wide, nearly flat; bracts 2, about 1 cm. long; pedicels 1–2 cm. long; sepals rose-colored, ovate, usually acute, 4–6 mm. long; petals ovate-oblong, mostly obtuse, slightly longer. On rocky banks: Ill.—Mo.—Kans.—Sask. *Plain.* Jl–S.

31. *A. bisceptrum* S. Wats. Bulbs ovoid, 1–1.5 cm. thick; scapes often more than one, 2–4 dm. high, stout; leaf-blades broad, flat, 4–10 mm. wide, 1.5 dm. long or more, attenuate; bracts 2; flowers numerous; petals and sepals broadly lanceolate, acuminate, white or pink, 7–8 mm. long, not ribbed but slightly gibbous at the base. Moist soil: Utah—Nev.—Calif. *Submont.* My–Je.

32. *A. Palmeri* S. Wats. Bulb almost globose; scape 1.5–3 dm. high, slender; leaf-blades 1 dm. long or less; bracts 2, lanceolate, about 1 cm. long; flowers 12–24; petals and sepals pink, ovate-lanceolate, slightly gibbous at the base, acute or acuminate. Dry regions: s Utah—Ariz.—N.M. *L. Son.*

33. *A. pleianthum* S. Wats. Bulb ovoid, 1–1.5 cm. thick; scape 5–12 cm. high, flattened; leaf-blades 1–1.5 dm. long, 4–7 mm. wide, falcate; bracts 2; petals and sepals white or pink, lanceolate, acuminate, keeled and gibbous at the base, 8–10 mm. long. Valleys: Ore.—Ida. *Son.* Ap–Je.

34. *A. cristatum* S. Wats. Bulb ovoid, about 2 cm. thick; outer coat rather thick, brown; reticulations faint, irregularly quadrangular; scape less than 1 dm. high; leaf-blades 1 dm. long or less, 2–3 mm. wide; bracts 2 or 3, 1.5 cm. long; petals and sepals light rose-colored, with darker midveins, about 1 cm. long, lanceolate; crests of the ovary very long, glandular-toothed. Dry places: Utah—Ariz. *L. Son.* Ap.

35. *A. nevadense* S. Wats. Bulb nearly globose, 1–1.5 cm. thick; outer coat thick and brown; reticulations irregular, with sinuate or curved sides; scape less than 1 dm. high; leaf-blades 1 dm. or less, flat, 2–3 mm. wide; bracts 2, about 1.5 cm. long; sepals and petals lanceolate, 6–8 mm. long. Mountains and hillsides: Nev.—Utah—Ariz. *Son.—Submont.* My–Jl.

2. DIPTEROSTEMON Rydb.

Perennials, with fibrous-coated bulbs, few basal narrow leaves, and naked scapes. Flowers in subcapitate umbels, with 3-5 membranous colored bracts. Perianth funnelform or campanulate, purple; segments united half their length. Stamens 6; filaments subulate, adnate to the perianth-tube, those opposite the sepals naked, those opposite the petals with two lanceolate lobes or wings at the base; anthers basifixed. Capsule ovoid, 3-celled; cells many-seeded.

Perianth-tube funnelform, gradually widening into the limb; bracts broad, conspicuously exceeding the pedicels 1. *D. capitatus*

Perianth-tube cylindro-campanulate, abruptly widening into the limb; bracts narrow, often exceeded by some of the unequal pedicels. 2. *D. pauciflorus*

1. *D. capitatus* (Benth.) Rydb. Scape 2-5 dm. high, leaves 2-4 dm. long, 6-12 mm. wide, bracts ovate, lanceolate or elliptic, acute or obtuse, dark violet-purple; perianth purple, about 15 mm. long. *Brodiaea capitata* Benth. Hill-sides: Ore.—Utah—Calif. Son. Ap-Je.

2. *D. pauciflorus* (Torr.) Rydb. Scape 1-3 dm. high; leaves 1-3 dm. long, 2-5 mm. wide, bracts lanceolate, 7-10 mm. long, mostly white, tinged with lilac and purple-veined, perianth about 12 mm. long, purple. *B. capitata pauciflora* Torr. Arid regions. N.M.—s Utah—s Calif. L. Son. Ap-Je.

3. HESPEROSCÖRDUM Lindl.

Plants with fibrous-coated bulb, few basal narrow leaves, and naked scapes. Flowers in bracted umbels; bracts 3-5. Perianth openly turbinate; segments united one-third their length, white or lilac; lobes ascending. Stamens 6, adnate to the tube of the perianth; free portion of the filaments above the throat deltoid; anthers versatile, oblong. Capsule ovoid, stipitate, triangular in cross-section.

1. *H. lacteum* Lindb. Bulb globose, 15-18 mm. thick; scape 3-5 dm. high; leaves 2-3 dm. long, 3-5 mm. wide; bracts narrowly lanceolate, less than 1 cm. long; flowers many; perianth white, with greenish or purplish veins, 12-15 mm. long; segments oblong or elliptic, obtuse. *Brodiaea lactea* S. Wats. Moist rich soil: B.C.—Ida.—Nev.—Calif. Submont. My-Je.

4. TRITELÆIA Dougl. WILD HYACINTH.

Plants with fibrous-coated bulbs, few basal elongated leaves, and naked scapes. Flowers in bracted umbels; bracts 3-5. Perianth from campanulate to narrowly funnelform, in ours blue or purple; segments united half their length or more; lobes ascending. Stamens 6; filaments adnate to the perianth-tube and the inner ones even to its lobes, making them apparently inserted in two distinct series; anthers distinctly versatile; capsule elongated-ovoid or ellipsoid, more or less distinctly stipitate, 3-valved, many-seeded.

1. *T. grandiflora* Lindl. Bulb globose, deep-seated, about 2 cm. thick; scape 3-6 dm. high; flowers rather many; perianth about 2 cm. long, campanulate; lobes elliptic or oval, obtuse. *Brodiaea Douglasii* S. Wats. Rich soil: B.C.—Mont.—Wyo.—Utah—Ore. Submont. Ap-Jl.

5. ANDROSTÉPHIUM Torr.

Scapose herbs, with membranous-coated bulbs. Leaves basal, with elongated narrow blades. Bracts several. Flowers perfect, short-pedicelled. Petals and sepals blue, or rose-colored, united to about the middle into a funnelform tube. Stamens 6, adnate to the perianth-tube; filaments united at least to the middle into a tube, which bears tooth-like lobes between the free portion of the filaments; anthers introrse. Ovary 3-celled; style filiform. Seeds several in each locule. Capsule 3-angled. Seeds few, black.

1. *A. breviflorum* S. Wats. Bulb ovoid, fibrous-coated, 1.5-2 cm. broad; scape 1-3 dm. high; bracts lanceolate, scarious; flowers rather few; pedicels 1-2 cm. long; perianth 15-20 mm. long; lobes oblong; lobes of the crown shorter than the anthers; pod 15-18 mm. in diameter. *Brodiaea Paysonii* A. Nels. Dry regions: w Colo.—s Utah—s Calif. Son. Ap.

Family 21. **LILIACEAE.** LILY FAMILY.

Perennial herbs, mostly caulescent, with bulbs, corms, or short rootstocks. Flowers in terminal racemes, corymbs, panicles, or rarely solitary. Sepals and petals each 3, similar, petaloid, sometimes partly united. Stamens 6. Pistils of 3 united carpels; ovary superior, 3-celled; styles united. Fruit a loculicidal capsule.

Plant with a short rootstock; flowers subumbellate on subterranean pedicels from the crown of the rootstock, petals and sepals united into a long tube 1. **LEUCOCRINUM**

Plant with bulbs or corms, either leafy-stemmed or scapiferous; petals and sepals distinct or nearly so.

Bulb scaly, plant tall, leafy

Anthers versatile, petals and sepals oblanceolate, clawed, with a linear nectariferous groove 2. **LILIUM**

Anthers fixed near the base, slightly if at all versatile; petals and sepals obovate-oblanceolate, not clawed, nectary a shallow pit.

Styles distinct from the middle, flowers purple, mottled with yellowish green; fruit winged 3. **FRITILLARIA**.

Styles connate to the summit; flowers yellow or orange; fruit not winged 4. **OCHROCODON**.

Bulb tunicated.

Anthers strictly basifixed

Leaves 2, basal or nearly so; flowers nodding 5. **ERYTHRONIUM**.

Leaves several, alternate, flowers not nodding.

Flowers in ours usually solitary; pedicels not jointed; dwarf alpine plant. 6. **LLOYDIA**.

Flowers racemose; pedicels jointed below the middle, not alpine.

Anthers versatile, scapose plants with racemose flowers. 7. **EREMOCRINUM**.

8. **QUAMASIA**.

1. **LEUCOCRINUM** Nutt. STAR OF BETHLEHEM, MOUNTAIN LILY,
WILD TUBEROSE.

Low acaulescent herbs, with short rootstock and fleshy-fibrous roots. Leaves basal, numerous, surrounded by scarious sheaths. Flowers in umbel-like sessile clusters, with pedicels and ovaries under ground. Petals and sepals each 3, alike, united below into a long tube. Stamens 6; filaments adnate below to the tube of the perianth; anthers linear, attached near the base, introrse; style much elongated, filiform; stigma 3-lobed. Capsule triangular, obovoid.

1. **L. montanum** Nutt. Leaves thick, numerous, 1-2 dm. long, 2-8 mm. broad; flowers 4-8; perianth white; tube 3-8 cm long; lobes linear-oblong, about 2 cm. long; capsule truncate, 6-8 mm. long, 12-18-seeded. Hills and plains: Mont.—S.D.—n N.M.—Calif—Ore. Plain—Submont. My-Je.

2. **LILIUM** (Tourn.) L. LILY.

Tall, leafy herbs, with thick-scy bulbs and large funnelform or campanulate flowers. Petals and sepals each 3, similar, distinct, each with a nectariferous groove at the base within. Stamens 6; filaments filiform or subulate; anthers linear, versatile, longitudinally dehiscent. Ovary 3-celled, many-ovuled; style long, somewhat clavate; stigma 3-lobed. Capsule oblong or obovoid; seeds numerous, flat, horizontal, in 2 rows in each cavity.

Flower erect, solitary or subumbellate; petals and sepals unguiculate.

Leaves linear.

1. **L. umbellatum**.

Leaves lanceolate

2. **L. montanum**.

Flowers several, racemose, nodding; petals and sepals not unguiculate.

3. **L. columbianum**.

1. **L. umbellatum** Pursh. Stem leafy, 3-6 dm. high; leaves linear, acute, 4-7 cm. long, 2-7 mm. wide, mostly alternate and scattered, the uppermost forming one, seldom two whorls; flowers 1-3, umbellate; petals and sepals 5-6 cm. long; blade oval, red or orange, spotted below, acute; capsule almost cylindrical, about 6 cm. long, 15 mm. thick. In dry open woods: Mich.—N.M.—Ohio—Sask.—Ark. Plain—Submont. Je-Jl.

2. **L. montanum** A. Nels. A plant similar to the preceding, but with broader leaves; leaves, except the uppermost, alternate and scattered, 5-8 cm. long, 6-10 mm. wide; whorl 1, seldom 2; petals and sepals 5-6 cm. long; blades

oval, acute or short-acuminate; capsule cylindric-ovoid. Closely related to the eastern *L. philadelphicum* L. On hills and mountain-sides, among bushes: Mont.—N.M. *Submont.*—Mont. Je-Jl.

3. *L. columbianum* Hanson. Stem a meter or so high; leaves mostly verticillate, lanceolate, acute, 5–8 cm. long, 6–15 mm. wide; petals and sepals 3–4 cm. long, in age reflexed, linear-lanceolate, red, spotted; capsule obovoid, 2–3 cm. long, 15 mm. or more thick. *L. parviflorum* (Hook.) Holz. In open woods: B.C.—Ida.—Calif. *Submont.* Je—Au.

3. FRITILLARIA L. TIGER LILY, LEOPARD LILY.

Simple leafy herbs, with thick-scaly bulbs. Flowers open, campanulate, large, nodding; petals and sepals 3, nearly equal, oblong or ovate, deciduous, each with a nectariferous pit at the base. Stamens 6, hypogynous, free; anthers linear or oblong, attached at the base, not versatile. Ovary 3-celled; ovules numerous; style slender, 3-cleft. Capsule obovoid, globose or cylindric, 6-angled. Seeds numerous, flat, margined or winged.

Leaves lanceolate or linear-lanceolate.
Leaves narrowly linear.

1. *F. lanceolata*.
2. *F. atropurpurea*.

1. *F. lanceolata* Pursh. Stem stout, 3–6 dm. high, leafless below, leafy above, and 1–4-flowered; leaves in 1–3 verticils of 2's–4's, lanceolate or linear-lanceolate, obtuse, 3–10 cm. long; flowers dark purple, mottled with greenish yellow; petals and sepals lanceolate or oblong, acutish, 2–3 cm. long; capsule less than 2 cm. long and fully 2.5 cm. broad. In rich soil: B.C.—Calif.—Ida.—Mont. *Submont.* Mr—My.

2. *F. atropurpurea* Nutt. Stem slender, 1–4 dm. high, leafless below, leafy above, 1–4-flowered; leaves mostly scattered, alternate or the upper verticillate, narrowly linear, 3–8 cm. long, 3 mm. wide; flowers dark purple, mottled with yellowish green; petals and sepals elliptic to linear, 5–25 mm. long; capsule about 15 mm. long and as wide. *F. linearis* Coult. & Fish. On hillsides among bushes: Wash.—Calif.—N.M.—N.D.—Neb. *Plain*—*Submont.* My—Je.

4. OCHROCÛDON Rydb. YELLOW BELL.

Simple leafy herbs, with scaly bulbs. Leaves mostly scattered. Flowers yellow or orange, campanulate, nodding, solitary. Petals and sepals 3, oblong-spatulate, obtuse. Stamens 6, free; anthers attached at the base. Ovary 3-celled; style undivided; stigma slightly 3-lobed. Capsule obovoid, 3-valved.

3. *O. pudicus* (Pursh) Rydb. Stem low, strict, 1–3 dm. high, generally 1-flowered; leaves 1–5, scattered or subverticillate, linear, 3–10 cm. long, rather thick; flower yellow, or orange; petals and sepals oblong, obtuse, 12–20 mm. long; fruit obovoid, 3–4 cm. long, and 15–22 mm. thick, erect. *Fritillaria pudica* (Pursh) Spreng. In rich soil on hillsides: B.C.—Calif.—Utah—Wyo.—Mont. *Submont.*—Mont. Ap—My.

5. ERYTHRONIUM L. DOG-TOOTH VIOLET, ANDER-TONGUE, STAR-STRIKERS.

Low herbs, with membranous-coated corms and simple scapiform stems bearing two leaves below. Flowers solitary or few, nodding; petals and sepals lanceolate, distinct, with a nectariferous groove. Stamens 6, hypogynous, free; anthers oblong to linear, attached at the end. Ovary 3-celled; ovules numerous in each cell; style filiform, or thickened above, often 3-cleft. Capsule obovoid or oblong, in ours bluntly 3-angled.

Style more or less clavate.

Anthers of the stamens subequal.

Anthers 3–4 mm. long; rarely longer, light yellow.

Anthers 4–8 mm. long, usually purplish, in age yellowish.

Petals 2–3 cm. long; their veins almost equal and equally distributed.

Petals 3–5 cm. long (in secondary flowers sometimes smaller); midvein prominent, separated from the next veins by rather broad veinless spaces, side veins branched and arching towards the margin.

1. *E. parviflorum*.
2. *E. obtusatum*.
3. *E. grandiflorum*.

Anthers of the inner set of stamens much longer than those of the outer; veining of petals resembling that of *E. grandiflorum*.
 Style filiform or nearly so, petals narrowly linear-lanceolate.

4. *E. utahense*.
 5. *E. leptopetalum*

1. *E. parviflorum* (S. Wats.) Goodding. Scape 1-3 dm. high, 1-4- (rarely 5-7-) flowered; sepals and petals lanceolate, acuminate, 2-3 cm. long, bright yellow; capsule short, oblanceolate-oblong to nearly obovate, 3-4 cm. long, 1-1.5 cm. thick. *E. grandiflorum parviflorum* S. Wats. Rich soil: Colo.—Wyo.—Utah. *Submont.*—*Subalp.* Ap—Au.

2. *E. obtusatum* Goodding. Scape 2-4 dm. high, 1-3-flowered; leaf-blades oblanceolate or oblong, broadest usually above the middle, obtuse and apiculate or acute, 1-2 dm. long; petals and sepals pale yellow, in age becoming whitish or purplish, 2-3.5 cm. long; filaments dilated at the base, subulate; capsule oblanceolate, 3.5-5 cm. long, a little more than 1 cm. thick. Rich soil: B.C.—Wyo.—Mont. *Submont.*—*Mont.* Ap—Au.

3. *E. grandiflorum* Pursh. Scape 2-4 dm. high, 1-3-flowered; leaf-blades from lanceolate to oval or ovate-lanceolate, mostly acute, usually broadest at or below the middle, 1-2 dm. long; sepals and petals light yellow, 3-5 cm. long; filaments slender but somewhat dilated below; capsule oblong, tapering at the base, 3-4 cm. long, about 12 mm. thick. Rich soil: B.C.—Wash.—Wyo.—Mont. *Submont.*—*Mont.* My—Jl.

4. *E. utahense* Rydb. Scape 1.5-3 dm. high, 1-3-flowered; leaf-blades oblanceolate, 1-2 dm. long, acute or obtuse, 1.5-4.5 cm. wide; sepals and petals 2.5-3 cm. long, narrowly lanceolate, acute or acuminate; filaments subulate, dilated below; capsule obovoid, about 2 cm long and 1 cm. thick. Mountains: Utah. *Submont.*—*Mont.* My—Jl.

5. *E. leptopetalum* Rydb. Scape 1.5-2 dm. high, slender; leaf-blades broadly oval, about 12 cm. long and 6 cm. wide; sepals and petals narrowly lanceolate, about 3.5 cm. long, 3-5 mm. wide, acute, evenly veined; filaments strongly dilated below; stigma deeply 3-cleft, with slender recurved lobes. Mountains near Boise City, Ida. Je.

6. *LLÖYDIA* Salisb. ALP LILY.

Dwarf caulescent herbs, with bulbs. Leaves narrow, grass-like. Flowers white in terminal racemes (often reduced to a single flower). Sepals and petals each 3, nearly alike, with a transverse fold-like gland near the base. Stamens 6, distinct; filaments subulate; anthers basifixed, dehiscent by marginal slits. Ovary triangular, 3-celled; ovules numerous in 2 rows in each cell, anatropous; style persistent; stigma 3-lobed. Capsule loculicidal at the apex.

1. *L. serotina* (L.) Sweet. Bulb oblong, fibrous-coated, ending a creeping rootstock; stem 5-15 cm. high; leaves several, 5-10 cm. long, 1-2 mm. wide; perianth about 1 cm. long, broadly turbinate; petals and sepals oblanceolate, obtuse, yellowish white, purple-veined and tinged with rose on the back; capsule obovoid, 8 mm. long. Alpine-arctic regions among rocks: Alta.—N.M.—Nev.—Alaska; Eurasia. *Alp.*

7. *EREMOCRINUM* M. E. Jones. DESERT LILY.

Perennial herbs, with a small tunicated bulb. Stem more or less leafy at the base. Flowers racemose, scarious-bracted. Sepals and petals each 3, distinct, 3-nerved, spreading. Stamens 6; filaments linear, broader at the base; anthers linear, obtuse at the apex, subcordate at base, basifixed, in age incurved. Ovary 3-celled; style slender, elongated. Capsule loculicidal, each cell 2-seeded. Pedicels jointed near the base.

1. *E. albomarginatum* M. E. Jones. Bulb 5-6 mm. thick; stem 1-3 dm. high; leaves basal, 1-2 cm. long, 1-3 mm. wide; bracts ovate, scarious, 10-12 mm. long; flowers 1-3 at each node; pedicels 8-12 mm. long; perianth white, with green veins; petals and sepals 8-10 mm. long. Desert regions: Utah. Son. My.

8. **QUAMÁSIA** Raf. CAMASH, BLUE CAMAS, WILD HYACINTH,
SWAMP SEGO.

Perennial herbs, with scapiform stems and edible bulbs. Leaves basal, with elongated blades. Flowers in terminal racemes. Sepals and petals each 3, alike, distinct, blue, white, or purple. Stamens 6; filaments filiform, adnate to the base of the petals and sepals; anthers versatile, introrse. Ovary 3-celled; styles filiform; stigma 3-lobed; ovules numerous in each cavity. Capsule broad, 3-angled. Seeds black, shining.

Flowers somewhat oblique, about 2 cm. long; divisions 3-veined, or some of them 4- or 5-veined.

Flowers regular, about 3 cm. long, divisions all 5-7-veined.

1 *Q. Quamash*
2 *Q. Suksdorfii*.

1. **Q. Quamash** (Pursh) Coville. Bulb globose, 1.5-3 cm. thick; scape 3-6 dm. high; leaves 6-15 mm. broad, 2-4 dm. long; petals and sepals linear, blue, about 2 cm. long, exceeding the stamens, but slightly shorter than the style; capsules ellipsoid, 12-15 mm. long, on almost erect pedicels. *Camassia esculenta* Lindl. Meadows: Mont.—Utah—Calif.—B.C. Plain—Submont. Ap-Je.

2. **Q. Suksdorfii** (Greenm.) Piper. Bulb ovate, 1-3 cm. thick; scape 3-7 dm. high, few-flowered; leaves 2-3 dm. long, 0.5-2 cm. broad; petals and sepals 3-3.5 cm. long, 8 mm. wide, blue; capsules 1.5-2.5 cm. long, erect on pedicels which arch upwards. Meadows: Wash.—Ida.—Utah. Plain—Submont. My.

Family 22. **CONVALLARIACEAE**. LILY-OF-THE-VALLEY FAMILY.

Perennial herbs, with rootstocks and alternate, rarely basal leaves. Flowers perfect, in terminal or axillary racemes, panicles, umbels, or rarely solitary. Sepals and petals 3 or 2, similar, distinct or partly united, inferior. Stamens 6 or 4. Gynoecium of 3 or 2 united carpels; ovary 3- or 2-celled; styles united. Fruit in all our species a berry.

Stem leafy; leaves alternate.

Sepals and petals distinct

Flowers white, in terminal racemes or panicles, anthers introrse; stem simple.

Petals and sepals 3; stamens 6.

Petals and sepals 2; stamens 4.

1. *VAGNERA*.

2. *UNIFOLIUM*.

Flowers extra-axillary or terminal and solitary or in small umbelliform clusters, anthers extrorse or opening laterally; stem branched.

Flowers extra-axillary, greenish white, filaments slender, anthers acute.

Corolla campanulate.

Corolla rotate.

3. *STREPTOPUS*.

4. *KRUHSEA*.

Flowers terminal, yellow; filaments dilated; anthers obtuse.

5. *DISPORUM*.

Sepals and petals partially united into a tube; flowers axillary.

6. *POLYGONATUM*.

Stem scapiform, leaves basal, flowers in terminal umbels, or solitary and terminal

7. *CLINTONIA*.

1. **VAGNERA** Adans. WILD SPIKENARD, WILD LILY-OF-THE-VALLEY,
FALSE SOLOMON'S SEAL.

Caulescent herbs, with elongated rootstocks. Leaves broad, several-nerved. Flowers in terminal racemes or panicles. Sepals and petals white or greenish white, distinct or nearly so. Stamens 6; filaments subulate; anthers introrse. Ovary 3-celled; styles short; stigma 3-lobed; ovules 2 in each cavity. Berry globose. Seeds 1 or 2, with a thin testa. [*Smilacina* Desf.]

Inflorescence paniculate.

Petals and sepals scarcely half as long as the stamens; fruit dark purple

1. *V. brachypetala*.

Petals and sepals almost equalling the stamens; fruit red with purple spots.

Leaf-blades acuminate, the lower contracted at the base into distinct petioles, style about 0.5 mm. long.

2. *V. racemosa*.

Leaf-blades acute, all sessile and more or less clasping; style fully 1 mm. long.

3. *V. amplexicaulis*.

Inflorescence racemose.

Leaves 6-12, sessile.

Petals and sepals linear or linear-lanceolate.

4. *V. leptopetala*.

Petals oblong-lanceolate.

Pedicels short, slightly if at all longer than the flowers or the fruit; leaves lanceolate, acute.

5. *V. stellata*.

Pedicels long, the lower often 2-3 times as long as the flowers or the fruit.

Raceme strict, pedicels strongly ascending, leaves narrowly lanceolate, long-attenuate

6. *V. liliacea*

Raceme zigzag, pedicels spreading, leaves broadly lanceolate, usually abruptly acuminate.

7. *V. sessilifolia*

8. *V. trifolia*

Leaves 2-4, sheathing the low stem.

1. *V. brachypetala* Rydb. Stem stout, 5-8 dm. high, striate, puberulent; leaves subsessile or short-petioled, oval or ovate, 8-18 cm. long, 4-7 cm. wide, often short-acuminate and twisted at the apex; panicle rather dense; petals and sepals oblong, 1-1.5 mm. long, style about 0.5 mm. long; berry about 4 mm. in diameter. Hillsides: B.C.—Wash.—Ida. Submont.—Mont. My-Je.

2. *V. racemosa* (L.) Morong. Stem somewhat angled, finely puberulent above, 3-9 dm. high; blades elliptic or oval, 7-15 cm. long, 3-6 cm. wide, finely puberulent beneath; sepals and petals oblong, 2 mm. long or more; berry 5-6 mm. thick. *Smilacina racemosa* (L.) Desf. Woods and thickets: N.S.—Ga.—Colo.—B.C. Plain—Submont. My-Jl.

3. *V. amplexicaulis* (Nutt.) Morong. Stem 3-7 dm. high; blades ovate to lanceolate, acute, puberulent, 6-15 cm. long, 4-8 cm. wide; sepals and petals oblong, about 2 mm. long; filaments lanceolate-subulate; berry light red, dotted with purple, 5-6 mm. thick. *S. amplexicaulis* Nutt. Hillsides and woods: B.C.—Calif.—N.M.—Alta. Submont.—Mont. My-Jl.

4. *V. leptopetala* Rydb. Stem 2-3 dm. high, erect, strict or the upper portion somewhat zigzag, striate and pale; leaves oblong-lanceolate, 6-8 cm. long, 1-2 cm. wide, light green, sessile, long-acute; raceme 3-6-flowered; pedicels 5-8 mm. long; petals and sepals about 4 mm. long and less than 1 mm. wide, very thin, white. Cañons. Colo. Mont.

5. *V. stellata* (L.) Morong. Stem glabrous, 2-5 dm. high, strict; leaves sessile, minutely puberulent beneath, 5-13 cm. long; sepals and petals 3-5 mm. long; berry green, with 6 black stripes, turning black, 6-10 mm. thick. *S. stellata* (L.) Desf. In moist soil, meadows or copses: Newf.—Va.—Colo.—Alta. Submont.—Subalp. My-Jl.

6. *V. liliacea* (Greene) Rydb. Stem tall and strict throughout, 3-10 dm. high, leaves sessile, glabrous, 7-20 cm. long; raceme 4-10 cm. long, 3-10-flowered; sepals and petals oblong, obtuse, 5-7 mm. long; style about 1 mm. long; berry purplish, 7-10 mm. thick. *Unifolium liliaceum* Greene. Wooded hills and shady places: B.C.—Calif.—N.M.—Mont. Submont.—Mont. My-Je.

7. *V. sessilifolia* (Nutt.) Greene. Stem 2-4 dm. high, more or less flexuose above; leaves sessile, 0.5-10 cm. long, glabrous or nearly so; raceme 3-7 cm. long; sepals and petals linear-oblong, obtuse, about 6 mm. long; style about 1 mm. long; berry red or purple, 8-10 mm. in diameter. *S. sessilifolia* Nutt. Woods: Yukon—Calif.—Wyo.—Mont. Submont. Je-Jl.

8. *V. trifolia* (L.) Morong. Stem slender, 0.5-4 dm. high; leaves sessile, oval, oblong, or oblong-lanceolate, with sheathing bases, acute or acuminate; raceme few-flowered, strict; sepals and petals oblong or oblong-lanceolate, obtuse, about 3 mm. long; berry dark red, 5-6 mm. in diameter. *V. pumila* Standl., a small form with rather short style. In bogs and wet woods: Lab.—N.J.—Minn.—Mack. Boreal—Mont. My-Je.

2. UNIFOLIUM Adans. TWO-LEAVED SOLOMON'S SEAL.

Cauliscent herbs, with slender rootstocks. Leaves mostly 2 or 3, with broad, several-nerved blades. Inflorescence terminal, racemose. Sepals and petals white, similar, each 2, distinct, spreading. Stamens 4, hypogynous; filaments narrowly linear; anthers versatile, introrse. Ovary 2-celled; stigmas 2; ovules 2 in each cavity. Fruit a subglobose pulpy berry; seeds 1 or 2. [*Maianthemum* Wigg.]

Leaves subsessile; blades cordate-clasping, with shallow and narrow sinuses.

Stem-leaves distinctly petioled; blades with deep and open sinuses.

1. *U. canadense*

2. *U. dilatatum*

1. *U. canadense* (Desf.) Greene. Stem slender, 1-3-leaved (usually 2-leaved), 5-18 cm. high, glabrous; leaves ovate or ovate-lanceolate, 2-8 cm. long; berry pale red, speckled, about 4 mm. thick. Moist woods and thickets: Lab.—N.C.—S.D.—Mack. Boreal—Submont. My—Jl.

2. *U. dilatatum* (Wood) Howell. Stem 2-3-leaved, 2-4 dm. high, glabrous; leaf-blades broadly cordate, acuminate, 5-10 cm. long and nearly as broad, berry red, globose, about 6 mm. thick. *Maianthemum bifolium dilatatum* Wood. Swampy places: Alaska—Calif.—Ida.—Canadian Rockies. Submont.—Mont. Je—Au.

3. *STREPTOPUS* Michx. TWISTED-STALK.

Caulescent perennial herbs, with horizontal rootstocks. Leaves many-nerved, broad, sessile or clasping. Flowers racemose on 1-3-flowered, extra-axillary peduncles. Sepals and petals much alike, greenish or purplish, each 3, distinct, with spreading or recurved tips. Petals keeled. Stamens 6, hypogynous; filaments flattened, very short; anthers sagittate, opening by lateral slits. Ovary 3-celled; stigmas 3-lobed or entire; ovules in 2 rows in each cavity. Berry oval or globose; seeds numerous.

Plant branched; pedicels geniculate; berry white.
Plant simple; pedicels not geniculate, berry red.

1. *S. amplexifolius*.
2. *S. curvipes*.

1. *S. amplexifolius* (L.) DC. Stem 3-10 dm. high, flexuose-branched; leaves ovate or ovate-lanceolate, glabrous and glaucous, 5-13 cm. long; perianth campanulate, greenish white, 8-12 mm. long; sepals and petals lanceolate, attenuate; berry globose-ellipsoid, 8-12 mm. long. Damp woods: Greenl.—N.C.—N.M.—Ore.—Alaska; Eu. Submont.—Subalp. Je—Au.

2. *S. curvipes* Vail. Perennial, with a rather slender rootstock; stem simple, 1-3 dm. high; leaves sessile, oval to oblong-lanceolate, 3-8 cm. long, acuminate; perianth pale purple or rose-colored; sepals and petals lanceolate, 5-7 mm. long, minutely glandular-pubescent inside; berry globose, 7-9 mm. thick. Open woods: B.C.—Ore.—Alaska. Submont.—Mont. Je—Jl.

4. *KRÜHSEA* Regel.

Caulescent perennial herbs, with rootstocks. Leaves broad, sessile or slightly clasping, several-nerved. Flowers usually solitary, inserted opposite the leaves. Flowers rotate; petals and sepals with greenish reflexed tips. Stamens 6; filaments very short; anthers 2-lobed. Ovary 3-celled, becoming a berry. Style none.

1. *K. streptopoides* (Ledeb.) Kearney. Stem glabrous, 5-15 cm. high; leaves 4-8, bright green, ovate-lanceolate, acute, 3-5 cm. long; pedicels recurved, 1 cm. long or less; sepals and petals deeply wine-colored at the base, with yellowish green tips; fruit globose, bright red at maturity. *Smilacina streptopoides* Ledeb. *Streptopus ajanensis* Tiling *S. brevipes* Baker. *Kruhsea Tilingii* Regel. Woods: B.C.; Siberia. Mont. My.

5. *DÍSPORUM* Salisb.

Caulescent branched perennial herbs, with rootstocks. Leaves broad, many-nerved, sessile or clasping, often oblique. Flowers terminal, solitary or in small subumbellate clusters, drooping. Sepals and petals each 3, whitish or greenish yellow, narrow, distinct. Stamens 6, hypogynous; filaments filiform, or somewhat flattened; anthers exserted. Ovary 3-celled; stigmas entire or 3-cleft, ovules 2 or more in each cavity. Fruit thick, juicy, (in ours) bright red or orange.

Stigma 3-cleft; fruit deeply lobed, obtuse, papillose.
Stigma entire; fruit acutish, not papillose, but often pubescent.

1. *D. trachycarpum*.
2. *D. oreganum*.

1. *D. trachycarpum* S. Wats. Stem 3-6 dm. high, more or less flexuose, more or less pubescent; leaves sessile, ovate or oval to ovate-lanceolate, 3-9 cm. long, short-acuminate; perianth narrowly campanulate, ochroleucous, 10-15 mm. long; fruit depressed-globose, deeply 3-lobed, 8-10 mm. thick. *Prosartes trachycarpa* S. Wats. *D. majus* Britt., in part. Cañons and hillsides: Man.—N.M.—Ariz.—B.C. Plain—Subalp. My—Je.

2. *D. oreganum* (S. Wats.) W. Miller. Stem 3-6 dm. high, with ascending branches; leaves ovate-lanceolate, more or less short-villous when young, 5-10 cm. long, long-acuminate; perianth campanulate, yellow, 10-15 mm. long; fruit obovoid, 10-12 mm. long. *P. oreganus* S. Wats. Cañons and river banks: B C—Mont.—Calif.—Ida. *Submont.* My—Je.

6. *POLYGONATUM* (Tourn.) Hill. SOLOMON'S SEAL.

Cauliscent perennial herbs, with jointed rootstocks. Leaves in our species broad, many-nerved, sessile. Flowers in axillary 1-few-flowered racemes. Petals and sepals each 3, partly united, the free portion shorter than the tube, greenish or pinkish. Stamens 6, included; filaments partly adnate to the perianth-tube; anthers sagittate, introrse. Ovary 3-celled; stigma mostly capitate; ovules 2-6 in each cavity. Berry subglobose, dark blue or black. Seeds with a horny endosperm. [*Salomonina* Heist.]

1. *P. commutatum* (R. & S.) Dietr. Stem 3-25 dm. high, glabrous; leaves ovate or oblong, partly clasping, 5-15 cm. long; peduncles 1-8-flowered; perianth white or greenish, 1-2 cm. long, drooping; filaments glabrous, adnate to the perianth about half its length; berries 8-12 mm. thick, subglobose. *P. giganteum* Dietr. *S. commutata* Farwell. In woods: Ont.—Ga.—N.M.—Utah—Man. *Plain*—*Submont.* Je.

7. *CLINTONIA* Raf.

Subcaulescent perennial, with creeping rootstocks. Leaves basal or nearly so, broad, many-nerved. Flowers in terminal umbels, on an almost leafless scape, or in our species the umbel reduced to 1 or 2 flowers. Petals and sepals each 3, similar, petaloid, distinct. Stamens 6; filaments filiform; anthers versatile. Ovary 2- or 3-celled; style slender; stigma 2- or 3-lobed. Berry ovoid, thin.

1. *C. uniflora* (Schult.) Kunth. Sparingly villous; leaves 2-5, oblanceolate, 1-2 dm. long, 3-5 cm. broad; scape shorter than the leaves; flowers 1 or 2, white, campanulate, 18-22 mm. long, villous; sepals and petals oblanceolate, 9-11-nerved; fruit about 1 cm. long, 6-10-seeded. Woods: Alaska—Mont.—Calif. *Mont.* Je—Au.

Family 23. *DRACAENACEAE*. YUCCA FAMILY.

Shrubby plants or trees, with woody trunks or caudices, very leafy at the apex. Leaves narrow, rigid, often with marginal filaments or finely toothed. Flowers mostly perfect, or polygamo-dioecious, racemose or paniculate. Petals and sepals 3, similar. Stamens 6. Gynoecium of 3 united carpels. Ovary superior, 3-celled; styles very short, united or obsolete. Fruit a loculicidal capsule, or fleshy and indehiscent.

Flowers perfect, large; ovary many-ovuled and fruit many-seeded.

Styles evident; petals and sepals thin, petaloid, spreading in anthesis.

Styles wanting; petals and sepals thick, inflexed.

Flowers polygamo-dioecious; ovules 2 in each cell, but capsule often 1-seeded.

1. YUCCA.

2. CLISTOTUCCA.

3. NOLINA.

1. *YUCCA* (Rupp.) L. YUCCA, SPANISH BAYONET, SOAP-WEED, SOAP-ROOT, GRASS CACTUS.

Coarse plants, with woody trunks or caudices. Leaves firm, narrow, rigidly pointed, commonly with thread-like fibers along the edges, or serrulate or entire-margined. Flowers in terminal racemes or panicles, drooping. Sepals and petals each 3, distinct or slightly united at the base, usually white. Stamens 6, hypogynous; filaments enlarged above. Ovary 3-celled or imperfectly 6-celled, or 1-celled; style turgid; ovules numerous. Capsule either dry and dehiscent, or fleshy and indehiscent. Seeds numerous, thin, flat.

Fruit a dry capsule.

Leaves narrowly linear, very long.

Style stout, swollen, green

Style not swollen, white

Leaves linear-lanceolate, short, style not swollen, white.

Leaves not papillose

Leaves densely rough-papillose at least on the back.

Fruit fleshy.

1. *Y. glauca*
2. *Y. angustissima*.
3. *Y. Harrimantae*.
4. *Y. Gilbertiana*.
5. *Y. baccata*.

1. *Y. glauca* Nutt. Subacaulescent or branching with decumbent stems; leaves rigid, 6-12 mm. wide, 2-4 dm. long, white-margined, finely but sparingly filiferous; inflorescence 1-2 m. high, simple or somewhat branched; sepals and petals greenish white, oval to lanceolate, acute, 4-5 cm. long; capsule oblong, usually not constricted, somewhat roughened, brown. *Y. angustifolia* Pursh. Plains and hillsides: Ia—Tex.—Ariz.—Mont. *Plains—Submont.* My-Jl.

2. *Y. angustissima* Engelm. Acaulescent, with a thick horizontal root-stock; leaves 2-4 dm. long, 2-5 mm. wide, pungent, white-margined, very freely curly-filiferous; inflorescence 1-1.5 m. high, racemose, or short-branched below; sepals and petals rather short, lanceolate, acute; capsule scarcely 5 cm. long, rough, brown, constricted in the middle. Desert regions: Ariz.—s Utah. *L. Son.*

3. *Y. Harrimantae* Trelease. Acaulescent, often caespitose; leaves linear to lanceolate, 6-40 mm. wide, rigidly spreading, glaucous or green in age, pungent, narrowly brown-margined, with coarse curled fibers; inflorescence 2.5-5 dm. high, simple; sepals and petals greenish, oval, obtuse or acute; capsule brown, broadly oblong, about 4 cm. long, constricted. Dry regions: Utah—w Colo.—w N.M. *Son. Je.*

4. *Y. Gilbertiana* (Trelease) Rydb. Acaulescent; leaves linear, about 4.5 dm. long, 2 cm. wide, openly concave, glaucous at least on the upper side, pungent, fibrous-filamentose on the margin; flowers about 4 cm. long; segments narrow, acute; ovary papillate; style oblong, pale. *Y. Harrimantae Gilbertiana* Trelease. Dry regions: w Utah. *Au.*

5. *Y. baccata* Torr. Low, usually with stout prostrate branched caudex; leaves rigid, spreading, about 6 dm. long and 5 cm. wide, concave, shagreen-roughened, with narrow brown margins, coarsely filiferous; sepals and petals lanceolate, about 7.5 cm. long; style slender, elongate; fruit large, sometimes 2 dm. long, oblong- or conical-ovoid, pendent, fleshy. Dry plains: Tex.—s Colo.—Nev. *Son.—Submont.* Ap-Je.

2. CLISTOYÚCCA (Engelm.) Trelease. JOSHUA TREE.

Large tree. Leaves short, thick, not filiferous. Flowers in panicles. Sepals and petals each 3, thick, incurved at the end. Stamens 6, hypogynous; filaments thick, curved outward; anthers sagittate, horizontal. Ovary 6-celled; stigma sessile, 6-lobed. Capsule 6-celled, spongy, indehiscent. Seeds numerous, flat, thin.

1. *C. brevifolia* (Engelm) Rydb. A tree 5-10 m. high, with rough bark; leaves 1.5-2 dm. long, 6-15 mm. wide, rough, serrulate on the margin, spine-tipped, concave above; flowers in sessile short panicles; perianth campanulate, 4-6 cm. long, greenish white; capsule 5-7 cm. long. *Yucca brevifolia* Engelm. *Y. arborescens* Trelease. *C. arborescens* Trelease. Desert regions: s Calif.—s Utah—Ariz. *Son.*

3. NOLINA Michx.

Coarse herbs, with woody caudices. Leaves crowded, rigid, narrow, entire or serrulate, keeled, pungent-pointed. Flowers polygamo-diocious, in open panicles. Sepals and petals each 3, distinct, 1-nerved, similar, white. Stamens 6, reduced to staminodia in the fertile flowers; filaments thick, short. Ovary 3-celled, abortive in the staminate flowers; styles obsolete during anthesis. Ovules 2 in each cavity. Capsule dry, 3-winged, tardily and irregularly opening. Seeds often solitary, thick.

1. **N. Greeni** S. Wats. Leaves 6 dm. long, 1 cm. or more wide, rounded and smooth on the back, slightly channelled and striate inside, minutely scabrous on the margin; peduncle 1-2 dm. long, shorter than the leaves; fruit about 6 mm. wide; lobes almost orbicular. Dry mesa: Colo.—N.M. *Son.*

Family 24. **CALOCHORTACEAE.** MARIPOSA LILY FAMILY.

Perennial herbs, with coated corms and narrow leaves. Flowers perfect, regular, showy. Sepals 3, narrow, herbaceous. Petals 3, broad, gland-bearing within near the base and often bearded within, petaloid. Stamens 6, hypogynous. Gynoecium of 3 united carpels; ovary 3-celled, many-ovuled; styles united, almost none; stigmas 3, recurved. Fruit a septicidal, 3-angled capsule.

1. **CALOCHORTUS** Pursh SEGO LILY, MARIPOSA LILY, BUTTERFLY LILY.

Characters of the family.

Capsule winged.

Petals 1.5-2.5 cm. long, strongly arched and broadly pitted, leaves single, scape 1-4 flowered, bracts lanceolate.

Stem 1-2 dm. high, gland broad.

Stem 3-4 dm. high, gland very small

Petals 2.5-4 cm. long, less arched, not pitted, leaves usually 2, bracts linear

Purple spot of the petals lute-shaped, broader than long.

Purple spot of the petals almost orbicular.

Capsule not winged.

Flowers white or lilac.

Petals abruptly acuminate; gland oblong

Petals lilac, purplish, or light blue, with greenish midvein.

Petals cream-colored, tinged with purple and sometimes with a purplish spot.

Petals rounded or merely acute at the apex.

Anthers acute, gland broader than long

Anthers obtuse; gland not broader than long.

Stem erect, bulbiferous near the base

Stem flexuose, not bulbiferous.

Flowers yellow.

1. *C. elegans*.

2. *C. apiculatus*.

3. *C. pavonaceus*.

4. *C. eurycarpus*.

5. *C. macrocarpus*.

6. *C. acuminatus*.

7. *C. Gunnisonii*.

8. *C. Nuttallii*.

9. *C. flexuosus*.

10. *C. aureus*.

1. ***C. elegans*** Lindl. A delicate, slender glabrous plant, 1-2 dm. high; leaf surpassing the scape, 1-2 dm. long, 2-9 mm. wide; scape 1-3 flowered; petals oval or obovate, rounded or acute, 12-20 mm. long, white, tinged with purple, or purplish with whitish margins, densely bearded within and ciliate on the margins; capsule 2 cm. long, 12-15 mm. wide. On shaded hillsides: Wash.—Mont.—Utah—Calif. *Submont.* My-Jl.

2. ***C. apiculatus*** Baker. A slender glabrous plant, 3-4 dm. high; leaf shorter than the scape, about 2 dm. long, and 8-18 mm. wide; scape 2-3 flowered; petals obovate, acute or short-acuminate, 2-3 cm. long, white or cream-colored, tinged with purple, bearded within; capsule 2.5 cm. long and about 1 cm. wide. In rich woods: Alta.—Mont.—Ida.—Ore. *Submont.*—Mont. My-Jl.

3. ***C. pavonaceus*** Fernald. A rather stout plant, 3-6 dm. high; leaves shorter than the stem, the lower 2-3 dm. long, 5-12 mm. wide; flowers sub-umbellate; petals obovate, rounded or acute at the apex, more than 3 cm. long, lilac; anthers tapering somewhat upwards, but obtuse; capsule 25 mm. long, 15 mm. wide. *C. nitidus* Henders., also Purdy, not Dougl. In open meadows: Mont.—Wash.—Ore.—Ida. *Submont.*—Mont. Jl.

4. ***C. eurycarpus*** S. Wats. A strict, glabrous plant, 3-5 dm. high; leaves usually 2, the lower 1-2 dm. long, 2-12 mm. wide, much shorter than the stem; flowers subumbellate, resembling those of the preceding, but gland narrower; petals white or cream-colored with a round purple spot; anthers linear-oblong, obtuse; capsule as in the preceding. *C. nitidus* S. Wats., not Dougl. *C. nitidus eurycarpus* Henders. *C. umbellatus* A. Nels., not Wood. In open meadows: Wyo.—Mont.—Wash.—Ore. *Submont.*—Mont. Jl-Au.

5. ***C. macrocarpus*** Dougl. A rather stout and strict plant, 3-5 dm. high; leaves several, linear, revolute, and at last curled, 5-10 cm. long; bract similar;

flowers usually 2; petals obovate, about 4 cm. long; stamens tapering upwards, but obtuse; very variable in coloration and hairiness of the petals. *C. cyaneus*, *C. bruneanus*, and *C. maculosus* A. Nels. Sage-brush plains: B.C.—Mont.—Ida.—Ore. *Plain—Submont.* Je-Jl.

6. *C. acuminatus* Rydb. A low plant, 2-3 dm. high, bearing a bulblet 2-4 cm. above the bulb; leaves very narrow, involute and curved, 3-15 cm. long; flowers 1-2; petals obovate, about 3 cm. long; gland broadly oblong; anthers gradually tapering upwards, obtuse. On dry hillsides: Mont.—Utah—Colo. *Submont.—Mont.* Je-Au.

7. *C. Gunnisonii* S. Wats. A strict plant, 2-5 dm. high, without bulblet; leaves several, slender, mostly involute, 5-15 cm. long; flowers 1-2; petals broadly cuneate-obovate, 2-4 cm. long, white or cream-colored, tinged and streaked with purple, yellow and purple-dotted around the gland; capsule narrowed at both ends, about 3 cm. long. In meadows: (Black Hills) S.D.—N.M.—Ariz.—Ida. *Submont.—Mont.* My-Jl.

8. *C. Nuttallii* Torr. & Gray. A strict plant, similar to the preceding, 2-5 dm. high, but with a bulblet borne in the axil of the lowest leaf, 1-4 cm. above the bulb; leaves and flowers resembling those of the preceding, but petals often narrower, and sometimes acutish; capsule tapering at both ends. *C. Watsoni* M. E. Jones. Dry hillsides: (Black Hills) S.D.—N.M.—Calif.—Wash. *Submont.—Mont.* My-Jl.

9. *C. flexuosus* S. Wats. A decumbent or ascending, more or less flexuose and branched plant; leaves several, the lowest 1-2 dm. long, 2-3 mm. wide, the rest short, about 5 cm. long, acuminate; flowers several; petals broadly cuneate-obovate, 2.5-3 cm. long, white with yellow base; gland orbicular. In dry places: s Utah—Calif.—Ariz. *L. Son.* Je.

10. *C. aureus* S. Wats. Low plant, 1-2 dm. high, 1-4-flowered; leaves 7-10 cm. long; bracts lance-linear, attenuate, scarious margined; sepals greenish yellow, lanceolate, purple-blotched; petals broadly cuneate, about 3 cm. long, bright yellow, with a circular densely hairy gland near the base, and a purplish lunate spot above; capsule narrowly oblong. Sand-cliffs: s Utah—Ariz.—N.M. *L. Son.* Ap-Je.

Family 25. **TRILLIACEAE.** TRILLIUM FAMILY.

Perennial caulescent or scapose herbs, with rootstocks. Leaves and bracts whorled, broad and often netted-veined. Flowers perfect, solitary, terminal, or in terminal umbels. Sepals 3 (or in exotic genera 4), green, distinct; petals of the same number, in ours white or purplish. Stamens 6-8; filaments short. Gynoecium of 3 or 4 united carpels; ovary 3- or 4-celled; stigmas sessile. Fruit a 3- or 4-celled, lobed berry.

1. **TRILLIUM** L. WAKE-ROBIN, BIRTH-ROOT.

Fleshy herbs, with short stout rootstocks and a whorl of 3, netted-veined, leaves near the end of the scape. Flowers solitary, 3-merous, pedicelled or sessile. Sepals persistent. Petals early withering or deciduous, white or purple.

Flowers sessile; leaves long-petioled; blades rounded.
Flowers peduncled; leaves subsessile, rhombic.

1. *T. petiolatum*.
2. *T. ovatum*.

1. *T. petiolatum* Pursh. Rootstock corm-like; stem 1-2 dm. high; petioles 3-6 cm. long; leaf-blades 7-10 cm. long and 6-10 cm. wide; sepals 3-4.5 cm. long, linear-lanceolate; petals dark purple, linear-oblongate, slightly exceeding the sepals. Rich hillsides and copses: Wash.—Ida.—Ore. *Son.—Submont.* Ap-May.

2. *T. ovatum* Pursh. Rootstock corm-like; stem 3-4 dm. high; leaves acuminate, 7-12 cm. long, 4-8 cm. wide; pedicels 4-5 cm. long, slender; sepals linear-lanceolate, 2.5-4 cm. long; petals somewhat longer, obovate to narrowly lanceolate, pink or white, turning purple. *T. Scouleri* Rydb. *T. crassifolium* Piper. Woods: B.C.—Mont.—Colo.—Calif. *Submont.—Mont.* Mr-Jl.

Family 26. **SMILACACEAE.** SMILAX FAMILY.

Vines, with several-ribbed and netted-veined leaf-blades, articulate to the petioles. Flowers dioecious, in peduncled axillary umbels. Sepals and petals each 3, green, with spreading tips. Stamens 6; filaments flattened; anthers introrse. Gynoecium of 3 united carpels; stigmas 3, sessile. Fruit a berry, 1-6-seeded. Endosperm bony.

1. **NEMÉXIA** Raf. CARRION FLOWER, SMILAX.

Unarmed vines, with herbaceous stems. Leaves membranous, broad. Ovules 2 in each cavity. Berry blue-black, with 3 bands of strengthening tissue. [*Smilax*, in part.]

1. **N. lasioneuron** (Hook) Rydb. A herbaceous vine, 1-2 m. long; petioles 2-5 cm. long; leaf-blades ovate-cordate, abruptly short-acuminate, 5-10 cm. long, 5-9-ribbed, rather thin, glabrous above, scabrous-hirsutulous on the veins beneath; peduncles 4-7 cm. long; umbel many-flowered; flowers greenish; petals and sepals oblong, 4 mm. long; fruit 8-10 mm. thick, globose, purple with a bloom. *Smilax lasioneuron* Hook. *S. herbacea* Coult. Woods: Sask.—Kans.—Colo.—Wyo. Plain—Submont. My—Je.

Family 27. **AMARYLLIDACEAE.** AMARYLLIS FAMILY.

Perennial fleshy plants, with bulbs, corms, rootstocks, or woody caudices. Leaves basal, usually sheathing. Flowers perfect, racemose, paniculate, umbellate or solitary. Sepals and petals each 3, epigynous, often united into a tube below, petaloid. Stamens 6. Gynoecium of 3 united carpels; ovary inferior, 3-celled, or rarely only partially so; styles united. Fruit a 3-celled capsule or berry.

Perennial herbs, with fleshy leaves (often spiny-toothed), clustered on the caudex; anthers versatile; flowers in spikes or panicles.

Perennial herbs, with grass-like leaves, from a subterranean corm or short rootstock; anthers erect; flowers in ours umbellate.

1. AGAVE
2. HYPOXIS.

1. **AGAVE** L. AMERICAN ALOE, CENTURY PLANT.

Partially woody plants, with a more or less elongated caudex. Leaves crowded at the base, persistent several years, fleshy, thick, armed with spiny teeth, spine-tipped, channeled. Perianth withering-persistent. Stamens 6; filaments partly adnate to the perianth-tube; anthers versatile. Capsule 3-celled, thick-walled; seeds numerous, in 2 rows in each cell, black, flattened.

1. **A. utahensis** Engelm. Leaves very fleshy, 8-10 cm. long, terminating in a long channeled spine, sinuate, with flat teeth; spike dense; flowers in pairs or 4's; perianth yellowish, fully 1 cm. long; lobes oblong, obtuse, 3-4 times as long as the tube; capsule 18-20 mm. long. Desert regions: s Utah—Ariz. *L. Son.*

2. **HYPÓXIS** L. STAR-GRASS.

Acaulescent small herbs, with corms or short rootstocks and narrow grass-like basal leaves. Flowers perfect, regular. Sepals and petals each 3, equal, distinct above the ovary, yellow or whitish, the sepals green without. Stamens 6; filaments adnate only to the base of the perianth. short. Capsule 3-celled, thin.

1. **H. hirsuta** (L) Coville. Leaves narrowly linear, 2-5 mm. wide, longer than the scape, more or less villous; scape 5-15 cm. high, 1-6-flowered; flowers umbellate, 6-10 mm. long, bright yellow within, villous without. *H. erecta* L. Meadows: Me.—Fla.—Tex.—Sask. Plain. My—O.

Family 28. **IRIDACEAE.** IRIS FAMILY.

Perennial herbs, with elongated or bulb-like rootstocks and narrow equitant, 2-ranked leaves. Flowers perfect, regular or nearly so. Sepals and

petals each 3, often dissimilar but both colored, distinct or united below. Stamens 3, opposite to the sepals; anthers extrorse. Gynoecium of 3 united carpels; ovary inferior, 3-celled; styles distinct, sometimes petal-like. Fruit a loculicidal capsule. Seeds numerous.

Styles alternate with the stamens, filaments more or less united; flowers rather small. sepals and petals similar.

Filaments united to near the top; flowers blue or white, rarely rose-purple.

Filaments united only at the base, flowers rose or purple
 Styles opposite to and arching over the stamens, petal-like, filaments distinct. flowers large, sepals and petals unlike.

1 *SISYRINCHIUM*
 2 *OLSYNIUM*.
 3 *IRIS*

1. *SISYRINCHIUM* L. BLUE-EYED GRASS.*

Perennial grass-like herbs, ours tufted, with short rootstocks and fibrous roots. Leaves narrowly linear. Scapc 2-edged or 2-winged. Flowers in terminal clusters from spathe of 2 bracts. Petals and sepals in ours blue or white, alike, spreading. Filaments monadelphous. Style-branches filiform, alternate with the stamens. Ovules few in each cavity. Capsule subglobose, readily opening at the apex.

Stems bearing several peduncles from leaf-bearing nodes
 Stems simple and leafless, with sessile terminal spathe (casually with a terminal leaf-bearing node and a peduncle)

1. *S. radiculatum*.

Outer bract of spathe little or not at all longer than the inner one, rarely surpassing it by more than one-third its length

Small and slender, flowers 10 mm. or less long, capsules less than 3 mm. high

2. *S. halophilum*.

Stouter, flowers 12 mm. or more long, capsules 4 mm. or more high

Outer bract 2-3 cm. long, flowers becoming 14 mm. long

3. *S. occidentale*

Outer bract 3-6 cm. long, flowers becoming 18 mm. long

4. *S. idahoense*

Outer bract of spathe conspicuously prolonged, sometimes 2-3 times longer than the inner one

Plant developing capsules among the bases of the leaves different in form from those of the terminal spathes.

5. *S. heterocarpum*

No basal capsules.

Stem winged or margined.

Perianth-segments not emarginate, narrowed to the aristulate tip

Stems and leaves mostly 1-2 mm. wide, capsule obovoid-oblong, 6-7 mm. long

6. *S. alpestre*

Stems and leaves mostly under 1 mm. wide; capsule obovoid or subglobose, 3-5 mm. long.

7. *S. septentrionale*

Perianth-segments more or less retuse or abruptly contracted to the aristulate apex.

Stems and leaves mostly 1.5-2.5 mm. wide; capsules 4-6 mm. high.

8. *S. angustifolium*

Stems and leaves mostly 1.5 mm. or less in width, capsules 2-4 mm. high.

Bracts of spathe smooth; valves of capsule veinless.

9. *S. mucronatum*

Bracts of spathe minutely scabreulous; valves of capsule sparsely venose

10. *S. campestre*.

Stem practically marginless.

11. *S. inalatum*.

1. *S. radiculatum* Bickn. Stem erect, stout, 2-4 mm. wide, pale, 3-4.5 dm. high; basal leaves 2-3 mm. broad, 1-2 dm. long, hyaline-margined; peduncles 5-10 cm. long, unequal; bracts subequal, acute, 17-22 mm. long, scarious-margined; perianth violet-blue, about 10 mm. long; segments short-aristulate; ovary and young capsule densely glandular-puberulent. Wet meadows. Wyo.—Utah—Nev. Plain—Submont. My-Jl.

2. *S. halophilum* Greene. Stem erect, wiry and glaucous, 1-3 dm. high, very narrowly winged; leaves 1-2.5 mm. wide; bracts 12-18 mm. long, slightly scarious-margined; perianth-segments abruptly acuminate; capsule scarious-puberulent. *S. leptocaulon* Bickn. (?) *S. juncellum* Greene. Alkaline meadows. Ida.—Colo.—Calif. Submont. My-Jl.

3. *S. occidentale* Bickn. Stem 1.5-3.5 dm. high, 1-2 mm. wide, stiff, erect, glaucescent; leaves 1-2.5 mm. wide, very acute; bracts green or purplish, slightly scarious-margined, 2-3 cm. long, with broad margins; capsule subglobose glabrate. Wet meadows. Mont.—Colo.—Nev.—Ida. Plain—Mont. Je-Jl.

* Key and notes supplied by Mr. E. P. Bicknell.

4. *S. idahoense* Bickn. Stem 2-4.5 dm. high, pale green and glaucous, often twisted, 1-3 mm. wide, winged; leaves 1-3.5 mm. broad; spathe often deflexed, green or faintly purple; outer bract 3-6 cm. long, a little longer than the inner, both with narrow hyaline margins, perianth deep violet-blue, with a rather small yellow eye, abruptly cuspidate; capsule globose or ovoid. Wet meadows: Mont.—Wyo.—Ore.—B.C. *Submont.* My-Jl.

5. *S. heterocarpum* Bickn. Stem erect, 2-3 dm. high, 1-1.5 mm. wide, narrowly winged; leaves 1-2 mm. wide, attenuate; spathe sometimes purpletinged, narrow, 1-3 mm. wide; outer bract 2.5-4.5 cm. long, with hyaline margins below; inner bract 1.5-2 cm. long, hyaline-margined to the apex; perianth violet-purple, about 1 cm. long, with a large yellow eye; fruit of the terminal spathe 1-4, subglobose or somewhat obovoid, 5-7 mm. high; basal capsules among the leaves, 2-4, obovoid-pyriform, 7-10 mm. long, 4-5 mm. thick, with a narrow base, on slender pedicels 2.5-3.5 cm. long. Moist meadows and sandy ground: Wyo. Jl-Au.

6. *S. alpestre* Bickn. Stem 1-2 dm. high, green and glaucous, 1-1.5 mm. wide, narrowly winged, distinctly broadened into the spathe; leaves 1-2 mm. wide; spathe green; outer bract long and slender, 4.5-6.5 cm. long, with narrow hyaline margins; inner bract 1.8-3 cm. long; perianth 6-10 mm. long; segments white or tinged with purple. Alpine meadows: Colo. *Mont.* Au.

7. *S. septentrionale* Bickn. Stem 1-2.5 dm. high, slender, 0.5-1 mm. wide, barely margined, leaves 0.5-1 mm. broad; spathe purplish or green; outer bract 2.5-4 cm. long, the inner 1.5-2 cm. long, both hyaline-margined; perianth 4-7 mm. long, pale rose or violet. Wet meadows: Man.—N.D.—Wash.—B.C. *Plain.* Je-Jl.

8. *S. angustifolium* Miller. Stem stiff, glaucous, 1-5.5 dm. high, simple or rarely branched, 1-3 mm. wide, winged; leaves 1-3.5 mm. wide; spathe green or slightly purplish; outer bract 2-6.5 cm. long, obscurely hyaline-margined; inner bract 1.5-3 cm. long, hyaline-margined; flowers deep violet, 10-12 mm. long; capsule ellipsoid to subglobose. *S. montanum* Greene. Meadows: Newf.—Va.—Colo.—B.C. *Plain—Mont.* Je-Au.

9. *S. mucronatum* Michx. Stems numerous, 1-4.5 dm. high, 0.5-1.5 mm. wide, margined or narrowly winged; leaves dull green, slender, 1-1.5 mm., rarely 2 mm. wide; spathe usually red-purple, rarely green; outer bract 1.8-5.5 cm. long; inner bract 1-1.5 cm. long, scarious-margined; perianth deep purplish blue, rarely white, 6-14 mm. long; capsules subglobose. Wet places: Ont.—D.C.—Pa.—Alta. *Plain.* My-Jl.

10. *S. campestre* Bickn. Stem usually 1.5-2 dm. high, erect, stiff, glaucous, 0.5-1.5 mm. wide, narrowly winged; leaves 1-1.5 mm., rarely 2 mm. wide; spathe pale purple or green; outer bract 2.5-4.5 cm. long, narrowly hyaline-margined below; inner bract 1.2-2 cm. long, white-hyaline on the margins; perianth 8-14 mm. long, pale blue or white; capsule trigonous-subglobose. Prairies: Wis.—Mo.—La.—N.M.—N.D. *Plain.*

11. *S. inalatum* A. Nels. Stem simple, 3-4 dm. high, wingless, 10-atriate; leaves 9-15-nerved, 4-8 mm. broad, often somewhat arcuate; outer spathe 4-6 cm. long, many-nerved, scarious-margined; inner spathe 6-8-nerved, less than half as long; capsule 5-6 mm. long, obovoid-globose. Dry open hillsides: Ida. *Submont.* Je.

2. OLSÏNIUM Raf.

Perennial grass-like herbs, usually tufted. Leaves narrowly linear, equitant. Scape flattened but not winged. Flowers in terminal clusters, subtended by a spathe of 2 bracts. Petals and sepals rose or purple, spreading, similar. Filaments united only at the broad bases. Styles cleft at the apex. Capsule globose.

1. *O. grandiflorum* (Dougl.) Raf. Stem erect, stout, 2-3 dm. high, 2-3 mm. thick; outer bract 5-10 cm. long, broadly scarious-margined; inner bract scarcely half as long; corolla 15-20 mm. long; segments slightly cuspidate, obo-

vate; filaments shorter than the style; fruit 7-8 mm. thick. *Sisyrinchium grandiflorum* Dougl. Wet meadows: B.C.—Ida.—Utah—Calif. Son.—Submont. Mr.—Je.

2. IRIS L. BLUE FLAG, FLEUR-DE-LIS.

Herbs, with creeping, horizontal rootstocks. Leaves sword-shaped or linear. Flowers solitary or in terminal panicles. Sepals and petals highly colored, in ours blue, the former spreading or recurved, the latter usually smaller and erect. Stamens 3; filaments adnate below to the base of the sepals. Ovary 3-celled, styles petal-like, arching over the stamens; stigmas under the usually 3-lobed tips. Ovules numerous. Capsule elongated, 3- or 6-angled. Seeds in 1 or 2 rows, vertically flattened.

1. *I. missouriensis* Nutt. Stem 2-10 dm. high, about 5 mm. in diameter; leaves 1-5 dm. long, 5-10 mm. broad; perianth pale blue, variegated, glabrous, crestless; sepals broadly oblanceolate, about 8 cm. long; petals oblanceolate, ascending, about 6 cm. long; capsule oblong-elliptic, about 4 cm. long and 1.5 cm. thick, 6-ridged. *I. pelogonus* Goodding. Meadows, marshes and along streams: N.D.—N.M.—Calif.—B.C. *Plan.—Mont.* My.—Jl.

Family 29. ORCHIDACEAE. ORCHIS FAMILY.

Perennial herbs, usually succulent, with corms, bulbs, or rootstocks, and tuberous or fibrous roots. Flowers perfect, irregular. Sepals 3, similar or nearly so, the lower two sometimes united. Petals 3; the two lateral ones similar; the median one (the lip) usually very dissimilar, sometimes prolonged below into a spur, usually inferior by twisting of the ovary. Stamens 3, of which 1 or 2 are abortive, adnate to the pistil and forming a column. Fertile anthers usually solitary, in a few genera 2, usually 2-celled, containing 2-3 waxy or powdery pollinia, these pollen-masses usually stalked and often attached at the base to a viscid gland. Gynoecium of 3 united carpels; ovary inferior, 1-celled, twisted. Capsule 3-valved. Seeds numerous. Endosperm wanting.

Fertile stamens 2; lip a large inflated sack

Sepals distinct, lip with an almost conical obtuse prolongation below.

1. CRIOSANTHES.

Lower sepals united; lip rounded-saccate

2. CYPRIPIEDUM.

Fertile stamen 1.

Pollinia caudate at the base, attached to a viscid disk or gland.

Glands enclosed in a pouch-like fold; lip 3-lobed.

3. ORCHIS.

Glands not enclosed in a pouch.

Gland surrounded by a thin membrane; lip toothed at the apex.

4. COELOGLOSSUM.

Gland naked; lip entire.

Sepals 3-5-nerved, plants with rootstock or fibro-fleshy roots.

Stem scapiform; leaves 1-2, basal; anther-sacks divergent; plants in ours with rootstocks

Basal leaves 2; ovary straight.

5. LYSIAS.

Basal leaf 1; ovary arcuate.

6. LYSIELLA.

Stem leafy; anther-cells parallel or nearly so, plants with fleshy-fibrous roots.

7. LIMNORCHIS.

Sepals 1-nerved; plants with rounded or oblong, undivided biennial corms

8. PIPERIA.

Pollinia not produced into caudicles.

Pollinia granulose or powdery

Anthers operculate; leaves alternate.

Green plants, with large leaves

9. SERAPIAS.

Plant white, turning brownish, leaves reduced, scale-like.

10. EUBORPHYTON.

Anthers not operculate.

Leaves green, borne on the stem

Leaves alternate; spike mostly twisted.

11. IBIDIUM.

Leaves 2, opposite; spike not twisted.

12. OPHRYS.

Leaves usually white-reticulate, basal.

13. PERAMIMUM.

Pollinia smooth or waxy.

Plants with corms or solid bulbs, rarely with coralloid roots, leaves not scale-like.

Leaves unfolding before or with the flowers.

Lip flat; flowers racemed

Leaves cauline, column short; pollinia clavate.

14. MALAXIS.

Leaves basal, column elongated, pollinia globose.

15. LIPARIS.

Lip saccate; flower solitary

16. CYTHEREA.

Leaf 1, unfolding after the flowering time

17. APLECTRUM.

Plants with coralloid roots, bulbless, leaves reduced to scales

18. CORALLORRIZA.

1. CRIOSANTHES Raf. RAM'S-HEAD, RAM'S-HEAD LADIES' SLIPPER.

Perennial caulescent herbs, with rootstocks. Leaves sessile, alternate, several-veined, plaited. Flowers solitary, terminal. Sepals 3, distinct, spreading. Lateral petals narrow, spreading. Lips saccate, obtuse-conic, with the margin incurved, forming a rounded opening.

1. *C. arietinum* (R. Br.) House. Stem 2-3 dm. high, 1-flowered; leaves 3 or 4, elliptic or lanceolate, 5-10 cm. long; sepals lanceolate, 15-20 mm. long, brownish, petals linear, greenish brown, about as long; lip about 1.5 cm. long, white, veined and variegated with red. *Cypripedium arietinum* R. Br. Cold damp woods: Que.—N.Y.—Minn.—Sask. Boreal. My—Au.

2. CYPRIPEDIUM L. LADIES' SLIPPER.

Caulescent herbs, with rootstocks and fibrous roots. Leaves sessile, several-nerved, plaited. Flowers solitary or several in a terminal raceme. Sepals 3, the lateral two united under the lip. Lateral petals narrow, spreading. Lip conspicuous, an inflated round sack, with rounded opening, the margins incurved. Column declined, glabrous, bearing a fertile anther on each side, and a petaloid sterile stamen above, arching over the style. Pollen pulpy or granular, without tails or glands. Stigma terminal, broadest at the base. Capsule ribbed.

Leaves alternate, flowers solitary, terminal, or also several singly in the axils of the upper leaves

Sepals obovate to broadly obovate or oval, not longer than the lip, sterile stamen elliptic-cordate 1. *C. passerinum*.

Sepals lanceolate, attenuate, often longer than the lip

Lip white, purple-veined, sterile stamen ovate or obovate. 2. *C. montanum*.

Lip yellow, sterile stamen triangular, yellow and purple-spotted.

Lip 2-2.5 cm. long, broader than deep; lower sepal narrower than the upper one, exceeding the lip 3. *C. parviflorum*.

Lip 3-4 cm. long, deeper than broad, lower sepal fully as broad as the upper one or broader, usually shorter than the lip. 4. *C. veganum*.

Leaves 2, opposite or nearly so, flowers usually several in a contracted bracted spike.

5. *C. Knightiae*.

1. *C. passerinum* Richards. Stem 1-2.5 dm. high, often retrorsely villous; leaves oval to lanceolate, 5-10 dm. long, more or less viscid-villous; flowers 1-3; sepals 1-1.5 cm. long, the lower one slightly 2-cleft; petals oblong, obtuse, about 1.5 cm. long; lip about 1.5 cm. long, obovate, white, with purple spots inside. Pine woods: Ont.—Alta.—B.C.—Alaska—Mack. Boreal—Mont. Je—Jl.

2. *C. montanum* Dougl. Stem 3-5 dm. high, roughly glandular-puberulent, 1-3-flowered; leaves oval to lanceolate, 7-15 cm. long, roughly glandular-puberulent; sepals linear-lanceolate, 4-5 cm. long, greenish brown; petals narrowly linear-lanceolate; lip 2.5-3 cm. long. Open woods: B.C.—Calif.—Wyo.—Sask. Submont. Je—Jl.

3. *C. parviflorum* Salisb. Stem 2-6 dm. high, leafy, glandular-puberulent, usually 1-flowered; leaves oval to broadly lanceolate, often acuminate, 5-12 cm. long, puberulent; upper sepal lanceolate, acuminate, about 3 cm. long and 1 cm. wide; petals narrowly linear-lanceolate, longer than the sepals. Woods: Newf.—Ga.—Colo.—B.C. Plain—Submont. My—Jl.

4. *C. veganum* Cockerell. Stem about 3 dm. high, leafy, puberulent, 1-flowered; leaves broadly lanceolate, acuminate, 8-13 cm. long; sepals lanceolate, 3-4.5 cm. long; petals linear-lanceolate, 4.5-5.5 cm. long. Canyons: N.M.—Colo. Submont. Je—Jl.

5. *C. Knightae* A. Nels. Stem 3-10 cm. high, more or less villous-viscid in the inflorescence; leaves oval to nearly orbicular, 5-10 cm. long, glabrous or nearly so; sepals and petals purplish, ovate-lanceolate, acuminate, about 2 cm. long; lip 10-12 mm. long, greenish yellow, with deep purple margins; sterile stamen oblong, obtuse. Open woods and hillsides: Wyo.—Utah—Colo. *Submont.* Ap-Je.

3. *ORCHIS* (Tourn.) L. ORCHIS.

Perennial herbs, with digitately cleft tubers, or in our species with rootstocks and fibrous roots. Flowers in terminal spikes. Sepals distinct, equal, spreading, 3-nerved. Petals ascending, in ours narrower. Lip connate with the column, produced below into a spur, usually 3-cleft. Column short. Fertile anther solitary, 2-celled; sacs contiguous and slightly diverging; pollinia granulate, one large mass in each sac, produced into a slender caudicle, attached to a small gland, which is enclosed in a pouch.

✓ **1. *O. rotundifolia*** Pursh. Perennial, with a rather slender scaly rootstock; stem 1-2.5 dm. high, scape-like; leaf solitary, near the base, orbicular or oval, 3-7 cm. long; spike 2-6-flowered; flowers 12-15 mm. long; sepals elliptic, 6-7 mm. long, rose-colored, the lateral ones spreading; upper petals similar, but slightly shorter; lip white, purple-spotted, 3-lobed, with a large middle lobe, notched at the apex; spur slender, curved, shorter than the lip. Cold damp woods: Greenl.—N.Y.—Minn.—B.C.—Yukon. *Subalp*—*Boreal*. Je-Jl.

4. *COELOGLOSSUM* Hartman.

✓ Caulescent herbs, with 2-cleft biennial tubers. Leaves alternate, sessile. Flowers perfect, in elongated terminal spikes, greenish. Sepals distinct, converging, thus forming a hood. Lateral petals narrow, erect, lip obtuse, 2- or 3-toothed at the apex, produced below into a sack-like spur. Column short. Fertile anther solitary; anther-sacs 2. Pollinia solitary, with long caudicles. Gland small, surrounded by a thin membrane.

✓ **1. *C. bracteatum*** (Willd.) Parl. Stem 1.5-6 dm. high; leaves 3-5, obovate, oblanceolate, oval, or the upper narrowly lanceolate, 5-15 cm. long; bracts linear-lanceolate, longer than the flowers; flowers green or greenish, sepals lanceolate, about 6 mm. long; lip 6-8 mm. long, oblong or somewhat cuneate, 3-toothed at the apex, the middle tooth smallest; spur less than half as long as the lip. *Habenaria bracteata* (Willd.) R. Br. Wet meadows and woods: N.B.—N.C.—Colo.—B.C. *Mont.*—*Boreal*. My-S.

5. *LYSIAS* Salisb.

Subcaulescent herbs, with fleshy rootstocks or tubers. Leaves almost basal, 2 in number, broad and many-nerved. Flowers in terminal spikes, white or greenish. Sepals distinct, large, spreading; upper sepal in ours broadly cordate, the lateral ones obliquely ovate. Lateral petals small and narrow. Lip entire, narrow, produced below into a slender spur. Fertile anther solitary, *sacs diverging, with beak-like bases projecting forward. Pollinia with their caudicles laterally affixed to orbicular naked glands. Stigma without appendages.

Leaves orbicular or rounded oval; spur slightly clavate at the apex. 1. *L. orbiculata*.
Leaves oval or ovate, spur strongly clavate and curved at the apex. 2. *L. Menziesii*

1. *L. orbiculata* (Pursh.) Rydb. Scape stout, 3-6 dm. high, bearing several lanceolate bracts; basal leaves 1-1.5 cm. long, 8-12 cm. wide; raceme loosely many-flowered; lateral petals obliquely lanceolate; lip linear, 12-15 mm. long, spur 2-4 cm. long. *Habenaria orbiculata* (Pursh) Torr. Rich woods: Newf.—N.C.—Minn.—Wash.—(? B.C.). *Mont.*—*Boreal*. My-Au.

2. *L. Menziesii* (Lindl.) Rydb. Scape 3-4 dm. high, with 1-2 lanceolate bracts; basal leaves 10-12 cm. long, 6-8 cm. wide; raceme lax; pedicels 7-10 mm. long; lateral petals narrowly lanceolate; lip narrowly linear, 8-10 mm. long; spur less than 2 cm. long. *Platanthera Menziesii* Lindl. Wet woods: Mont.—Ida.—B.C. *Mont.* Jl-Au.

6. **LYSIELLA** Rydb.

Small herbs, with rootstocks. Stem scapiform, with a single obovate leaf at the base. Flowers greenish yellow. Upper sepal round-ovate, erect, surrounding the broad column; lateral sepals reflexed-spreading. Petals lanceolate, smaller; lip entire, linear-lanceolate, deflexed. Spur slightly curved, shorter than the ovary. Anther-sacs divergent, wholly adnate, arcuate; glands small, their faces incurved. Pod obovoid.

1. **L. obtusata** (Pursh) Rydb. Stem slender, 1-2.5 dm. high, glabrous; leaf 5-12 cm. long; spike 2-6 cm. long, loosely flowered; flowers about 1 cm. long; spur longer than the lip, slender, straight. *Habenaria obtusata* Richards. Boggy places in the woods: Newf.—N.Y.—Colo.—Alaska. *Mont.*—*Subalp.* Je—Au.

7. **LIMNORCHIS** Rydb. Bog ORCHID.

Leafy-stemmed plants, with elongated fusiform root-like tubers and fleshy-fibrous roots. Flowers whitish or greenish or tinged with purple. Upper sepal ovate to almost orbicular, erect, 3-7-nerved; lateral sepals from linear to ovate-lanceolate, free from the lip, 3-nerved, seldom 4-5-nerved, spreading or often somewhat reflexed. Lateral petals erect, lanceolate, 3-nerved, oblique at the base. Lip entire, flat or slightly concave, reflexed, free, from linear to rhombic-lanceolate, obtuse. Column short and thick. Anther-sacs parallel, opening in front.

Lip more or less lanceolate, *f. e.* broad near the base

Flowers greenish or purplish, lip not rhombic at the base.

Spur decidedly clavate, thickened and obtuse at the apex, shorter than the lip.

Petals purplish; spur only one-half to two-thirds the length of the lip, very

saccate

Lip linear or nearly so, 5-7 mm. long; ovary slightly curved, spike usually

elongated.

Lip lanceolate, fleshy, 4-5 mm. long; ovary strongly curved, spike usually

short.

Petals greenish; spur almost equalling the lip.

Spur slender, scarcely thickened at all towards the apex, often acutish, equal-

ling or slightly exceeding the lip; plant tall and stout; flowers comparatively

large, sepals 4-6 mm. long

Flowers white or nearly so, lip lanceolate, decidedly dilated, subrhombic at the base.

Spur only slightly if at all exceeding the lip

Spur usually shorter than the lip and clavate.

Spur equalling or slightly exceeding the lip, slightly or not at all clavate.

Spur from one-fourth to two-thirds longer than the lip.

Lip linear, *f. e.*, not at all dilated at the base.

Spur shorter than the lip, decidedly saccate.

Spur much exceeding the lip, filiform.

Spike comparatively dense.

Spike very lax.

1. *L. stricta*.

2. *L. purpurascens*.

3. *L. viridiflora*.

4. *L. media*.

5. *L. borealis*.

6. *L. dilatata*.

7. *L. leucostachys*.

8. *L. ensifolia*.

9. *L. laxiflora*.

1. **L. stricta** (Lindl.) Rydb. Stem tall and strict, 3-10 dm. high; lower leaves oblanceolate, obtuse, 5-12 cm. long, the upper lanceolate, acute; spike 1-3 dm. long, lax; flowers 12-14 mm. long; lip linear, obtuse, 5-7 mm. long, thick, purple. *Platanthera stricta* Lindl. *Habenaria gracilis* S. Wats. Bogs and wet meadows. Alta.—N.M.—Ore.—Alaska. *Submont.*—*Mont.* Je—Au.

2. **L. purpurascens** Rydb. Stem stout, 3-5 dm. high; leaves ovate to lanceolate, acute, 6-10 cm. long, dark green; spike rather dense; flowers 10-12 mm. long; lip about 5 mm. long, scarcely at all dilated at the base. Damp wooded hillsides and brook-banks. Colo. *Submont.*—*Subalp.* Je—Jl.

3. **L. viridiflora** (Cham.) Rydb. Stem 2-5 dm. high; lower leaves 5-15 cm. long, oblanceolate, obtuse; spike short and dense; flowers 10-12 mm. long, light green; lip lanceolate, obtuse, less than 5 mm. long. *Habenaria hyperborea* Coult., not R. Br. Bogs: Alta.—Colo.—Alaska. *Submont.*—*Mont.* Je—Au.

4. **L. media** Rydb. Stem very stout, 4-8 dm. high; leaves lanceolate, acute, 1-2 dm. long; spike long, densely flowered; flowers divaricate, about 15 mm. long; lip about 6 mm. long. Bogs: Que.—N.Y.—(Black Hills) S.D. *Boreal*—*Submont.*

✓ 5. *L. borealis* (Cham.) Rydb. Stem tall and leafy, 4-8 dm. high; lowest leaves oblanceolate and obtuse, the rest lanceolate, acute, 5-15 cm. long; spike often rather dense, 1-2 dm. long; flowers 10-14 mm. long; lip rhombic-lanceolate, obtuse, about 5 mm. long. *Habenaria dilatata* Coult., not Hook. Bogs: Mont—Colo.—Wash.—Alaska. *Submont.*—*Mont.* Je-S.

6. *L. dilatata* (Pursh) Rydb. Stem slender, tall, leafy, 3-6 dm. high; leaves lanceolate, 7-20 cm. long, the lower obtuse, the upper acute; spike 5-25 cm. long, usually rather lax; flowers white, 15-18 mm. long; lip about 7 mm. long. *Habenaria dilatata* (Pursh) Hook. Bogs: Lab.—N.Y.—Neb.—Sask. *Boreal.* Je-Au.

7. *L. leucostachys* (Lindl.) Rydb. Stem stout and tall, 6-10 dm. high; lower leaves oblanceolate, 1-2 dm. long; spike 1-3 dm. long, rarely very dense; flowers 15-20 mm. long; lip about 8 mm. long. *Habenaria leucostachys* (Lindl.) S. Wats. Bogs: Alaska—Ida—Utah—Calif. *Submont.* Je-Au.

8. *L. ensifolia* Rydb. Stem strict, 3-4 dm. high, light colored, few leaved; leaves linear-lanceolate, attenuate, slightly falcate, 1-1.5 dm. long; flowers greenish, about 15 mm. long; lip linear, about 8 mm. long, thick; spur about 1 cm. long. Bogs: N.M.—Utah—Ariz. *Son.* Jl.

9. *L. laxiflora* Rydb. Stem slender, 4-6 dm. high; lower leaves oblanceolate, 8-10 cm. long; spike 1-2 dm. long, few-flowered; flowers greenish, 10-12 mm. long; lip about 6 mm. long; spur about 8 mm. long, slightly clavate. Bogs: Ore—Colo.—Utah. *Son.*

8. PIPÉRIA Rydb. WOOD ORCHID.

Somewhat leafy-stemmed plants, but the leaves usually near the base and withering at or before the anthesis. Tubers spherical or rounded ellipsoid. Flowers greenish or white; sepals and petals 1-nerved or very obscurely 3-nerved; the upper erect, the lateral ones spreading. Lateral petals free, lanceolate or linear-lanceolate, oblique. Lip linear-lanceolate to ovate, obtuse, truncate or hastate at the base, concave, united with the bases of the lower sepals, bordered with an erect margin which connects the lip with the column. Anther-sacs parallel, opening nearly laterally.

Spur slightly exceeding the lip.

Spur 2-3 times as long as the lip, filiform

Lip linear to lanceolate, about 6 mm. long; spike dense, spur 15-18 mm. long

Lip ovate or ovate-lanceolate; spike looser; spur 10-12 mm. long.

1. *P. unalaschensis*

2. *P. multiflora*.

3. *P. elegans*

1. *P. unalaschensis* (Spreng.) Rydb. Stem strict, slender, 3-5 dm. high, leafy only near the base; leaves oblanceolate, obtuse or acutish, 1-1.5 dm. long, stem-leaves bract-like; spike long and lax, 1-3 dm. long; flowers greenish, 8-10 mm. long; petals and sepals 2-4 mm. long; lip oblong, obtuse; spur filiform or slightly clavate. *Habenaria unalaschensis* (Spreng.) S. Wats. Damp woods. Mont.—Colo.—Calif.—B.C.—(? Alaska); also Que. *Submont.*—*Mont.* Je-Au.

2. *P. multiflora* Rydb. Stem stout, 4-6 dm. high; basal leaves oblong or oblanceolate, obtuse or acutish, 1-1.5 dm. long; upper stem-leaves much reduced and bract-like; flowers greenish white, spreading, about 1.5 cm. long, spur 15-18 mm. long, filiform. Damp woods: Wash.—Mont.—Calif. *Submont.* Je-Au.

3. *P. elegans* (Lindl.) Rydb. Stem slender, strict, 4-7 dm. high; basal leaves 2 or 3; blades lanceolate or oblanceolate or rarely oval, acute or obtuse, 8-15 cm. long; stem-leaves much reduced, lanceolate; spike usually lax, 1.5-3 dm. long; flowers greenish white, about 1 cm. long; spur filiform. *Habenaria elegans* (Lindl.) Bolander. *Piperia elongata* Rydb. Damp woods: B.C.—Ida.—Calif. *Submont.* Je-Au.

9. SERÀPIAS L. HELLEBORINE.

Caulescent herbs, with rootstocks and fibrous roots. Leaves alternate, plaited, many-nerved, clasping. Flowers in bracted terminal racemes. Sepals

distinct, strongly keeled. Lateral petals distinct, ovate. Lip free, not spurred, concave below, constricted in the middle, the terminal portion dilated and petal-like. Column short. Fertile anther 1, erect, operculate; its sacs contiguous. Pollinia granulate, 2-parted, becoming attached to the beaked stigma. [*Epipactis* R. Br.]

1. *S. gigantea* (Dougl.) A. A. Eat. Stem 3-10 dm. high, nearly glabrous, puberulent in the inflorescence; lower leaves ovate, sessile, the upper narrowly lanceolate, 5-20 cm. long, acute or acuminate; flowers 3-10, greenish, veined with purple; lip 15-18 mm. long; the terminal portion ovate-lanceolate, many-crested; capsule oblong, 15 mm. long. *Epipactis gigantea* Dougl. Rich woodlands: Mont.—w Tex.—Calif.—B.C. Son.—Submont. Je—Au.

10. EBURÓPHYTON Heller.

Saprophytic perennial herb, with branched creeping rootstock; whole plant white, leafless, scarious-bracted. Flowers racemose, almost sessile. Lateral sepals horizontally spreading, larger than the upper sepal and the petals, strongly keeled, somewhat concave. Upper sepal and petals erect, less strongly keeled. Lip free, shorter than the sepals, the saccate base with broad wing-like margins, articulate at the middle, with a callosity on each side; outer internode curved outward and downward, concave, grooved. Column twice as long as the anther. Stigma beakless. Pollen-masses not attached to the gland.

1. *E. Austinae* (A. Gray) Heller. Stem 3-6 dm. high; perianth about 12 mm long; distal portion of the lip suborbicular; nerves in center wavy-crested; column 4 mm. long. *Chloraea Austinae* A. Gray. *Cephalanthera oregana* Reich. Pine woods: Calif.—Ida.—Wash. Mont. Je—Jl.

11. IBÍDIUM Salisb. LADIES' TRESSES.

Perennial herbs, with tuberous thickened or fleshy-fibrous roots. Leaves alternate, in some species mostly basal. Flowers in terminal spiral spikes. Sepals distinct or coherent above or united with the similar lateral petals. Lip concave, sessile or slightly clawed, bearing two callosities at the base. Column oblique, arched. Fertile anther solitary, erect, without a lid. Pollinia one in each sac. Stigma with a beak. [*Spiranthes* L. C. Rich. *Gyrostachys* Pers.]

Callosities at the base of the lip obsolete; lower sepals coherent with the petals and upper sepals
Callosities nipple-shaped, directed downwards; lower sepals free.

1. *G. strictum*.
2. *G. porrifolium*.

1. *I. strictum* (Rydb.) House. Stem 1.5-3.5 dm. high, glabrous; lower leaves 7-20 cm. long, linear or linear-oblancoelate, the upper bract-like; spike 5-10 cm. long, 8-14 mm. thick, dense; flowers 3-ranked, white or greenish, 6-8 mm. long, fragrant; lip oblong, broad at the base, contracted below the dilated crisp terminal portion. *Gyrostachys stricta* Rydb. *Spiranthes Romanzoffiana* Coult., not Cham. Wet places and rich hillsides: Newf.—Pa.—Colo.—Calif.—Alaska. Plain—Mont. My—S.

2. *I. porrifolium* (Lindl.) Rydb. Stem 2-4 dm. high, slender, glabrous; leaves narrowly oblanceolate or linear, rather thick, 1-2 dm. long; spike 5-10 cm long, 12-15 mm. thick, less dense; flowers greenish white; lip lanceolate, scarcely dilated at the apex. *Spiranthes porrifolia* Lindl. Marshes: Wash.—Ida.—Colo.—Calif. Submont. Je—Au.

12. ÔPHRYS (Tourn.) L. TWAY-BLADE, TWIFOLE.

Perennials, with rootstocks and fleshy-fibrous roots. Leaves 2, opposite, near the middle of the stem. Flowers in terminal racemes, greenish or purplish. Sepals and lateral petals distinct, almost alike, reflexed. Lip notched or 2-cleft at the apex, and often with a pair of teeth or auricles near the base. Fertile anther 1, erect, jointed to the back of the column, without a lid. Pollinia 2, powdery, attached to a minute gland. Column wingless. [*Listera* R. Br.]

Lip broad, slightly 2-cleft at the apex, with or without a mucro in the sinus.

Lip with distinct rounded auricles, slightly cleft at the apex; no mucro

1. *O. borealis*.

Lip with no auricles, but in their place two divergent small teeth at the base, mucro present.

Lip unguiculate; lateral teeth small, without a papilla at the base

2. *O. convallarioides*

Lip not unguiculate, lateral teeth prominent, with a papilla at the base

3. *O. caurina*.

Lip narrow, 2-cleft for about half its length into linear-lanceolate lobes, without a mucro, with narrow teeth at the apex. *L. borealis* Morong Damp woods: Mack.—Colo.—Yukon. *Subalp.* Je—Jl.

4. *O. nephrophylla*

1. *O. borealis* (Morong) Rydb. Stem 7–15 cm. high, pubescent above, leaves 1–3.5 cm. long, elliptic-ovate, obtuse at both ends, borne above the middle of the stem; flowers about 1 cm. long; lip 7–8 mm. long, oblong-cuneate, with 2 obtuse lobes at the apex. *L. borealis* Morong Damp woods: Mack.—Colo.—Yukon. *Subalp.* Je—Jl.

2. *O. convallarioides* (Sw.) Wight. Stem 1–2 dm. high, glabrous below, glandular above the leaves; leaves borne above the middle of the stem, broadly oval, obtuse, 3–5 cm. long, rounded at the base; lip about 9 mm. long, narrowly cuneate, retuse. *L. convallarioides* (Sw.) Torr. Moist woods: N.S.—Vt.—Mich.—Ida.—Calif.—Alaska. *Mont.* Je—Au.

3. *O. caurina* (Piper) Rydb. Stem 1–3 dm. high, glabrous below, densely glandular-pubescent above the leaves; leaves 3.5–7 cm. long, oval to elliptic-ovate, rounded at the base, borne above or at the middle of the stem; lip 5–6 mm. long, cuneate, retuse, with a blunt mucro in the sinus, sessile. *L. caurina* Piper. Damp mossy woods: B.C.—Mont.—Ida.—Ore. *Mont.* Je—Jl.

4. *O. nephrophylla* Rydb. Stem slender, 1–2 dm. high, glabrous or slightly pubescent above the leaves; leaves inserted at the middle, rounded-reniform, about 2 cm. long, 2–2.5 cm. wide, strongly veined; flowers greenish, 5–6 mm. long; sepals and upper petals oblong, 1.5–2 mm. long; lip 4–5 mm. long. *L. nephrophylla* Rydb. Damp woods: Mont.—N.M.—Ore.—Alaska. *Submont.*—*Subalp.* Je—Au.

13. *PERÀMIUM* Salisb. RATTLESNAKE PLANTAIN.

Caulescent perennial herbs, with rootstocks and fleshy-fibrous roots. Leaves alternate, mostly basal, strongly reticulate and often blotched. Flowers in terminal spikes, white or pink, inconspicuous. Lateral sepals distinct, spreading; the upper united with the lateral petals. Lip sessile, concave or gibbous, without callosities. Fertile anther solitary, short-stalked on the column, without a lid. Pollinia 2, one in each sac, attached to a small disk. Column straight, rather short. [*Goodyera* R. Br.]

Lip evidently saccate, with recurved margins.

1. *P. ophioides*.

Lip scarcely saccate, with incurved margins.

2. *P. decipiens*.

1. *P. ophioides* (Fernald) Rydb. Scape 1–2 dm. high, glandular-pubescent; leaves 1–2 cm. long, broadly ovate, dark green, usually with white blotches, most conspicuous along the cross-veins; flowers greenish white, 4–5 mm. long; upper sepal concave, with a short strongly recurved tip; anthers blunt. *Goodyera repens* Am. auth. and var. *ophioides* Fernald. Cold mossy woods: N.S.—N.C.—S.D.—N.M.—Alaska. *Mont.* Jl—Au

2. *P. decipiens* (Hook.) Piper. Scape 2–4 dm. high, glandular-pubescent; leaves ovate-lanceolate, 4–6 cm. long, acute at both ends, often without blotches; spike one-sided; flowers 7–9 mm. long; upper sepal concave, ovate-lanceolate, the tip long, often recurved; anthers ovate, long-pointed. *G. Menziesii* Lindl. *P. Menziesii* (Lindl.) Morong. Woods: Que.—N.H.—Minn.—Ariz.—Calif.—Alaska. *Submont.*—*Mont.* Jl—S.

14. *MALAXIS* Soland. ADDER'S MOUTH.

Caulescent perennial herbs, with corms. Leaves 2 or in our species 1, on the stem. Flowers in terminal racemes, white or greenish. Sepals distinct, spreading. Lateral petals very narrow, often filiform, spreading. Lip broad, cordate

or auricled at the base. Fertile anther 1, 2-celled, erect between the auricles. Pollinia 4, two in each sac, waxy, tail-less and without glands. Column embracing the lip. [*Microstylis* Nutt. *Achroanthes* Raf.]

Lip ovate, acuminate.

Lip broadly obcordate, with a tooth in the sinus.

1. *M. monophylla*.

2. *M. unifolia*.

1. ***M. monophylla*** (L.) Sw. Corm small, ovoid; stem 1-1.5 dm. high, glabrous, striate, leaf-blade 3-5 cm. long, oval, elliptic, or ovate; pedicels 2-4 mm long, nearly erect; capsule ellipsoid, 6 mm. long. *Microstylis monophylla* Lindl. *A. monophylla* Greene. Woods. Que.—Pa.—Colo.—Man.; Eu. Plain—Submont. J1-Au

2. ***M. unifolia*** Michx. Corm globose; stem 1-2.5 dm. high; leaf-blade ovate or nearly orbicular, 2-6 cm. long; flowers greenish, about 2 mm. long; pedicels 6-10 mm. long. *Microstylis ophioglossoides* Nutt. *Achroanthes unifolia* Raf. Woods: Newf.—Fla.—Ala.—Neb.—Sask. Plain. J1-Au.

15. **LIPARIS** L. C. Rich. TWAYBLADE.

Low, scapose, perennial herbs, with corms. Leaves 2-6, basal. Flowers in terminal racemes, greenish. Sepals narrow, distinct. Lateral petals distinct, filiform. Lip dilated, often bearing two tubercles above the base. Column elongated, incurved, margined above. Fertile anther solitary, terminal, lid-like. Pollinia 4, two in each sac, waxy; each pair slightly united, without tails and glands. [*Leptorchis* Thouars.]

1. ***L. Loeselii*** (L.) L. C. Rich. Corm globose; scape 5-20 cm. high, ribbed; leaves basal, elliptic or elliptic-lanceolate, 5-15 cm. long, obtuse; flowers greenish, lip obovate, pointed, shorter than the sepals; capsule about 1 cm. long, wide-angled on thick erect pedicels. *Leptorchis Loeseli* McMill. Woods and thickets: N.S.—Md.—Neb.—Sask. Plain.

16. **CYTHEREA** Salisb. CALYPSO, VENUS' SLIPPER.

Acaulescent perennial herbs, with corms. Leaf solitary, basal, petioled, with a broad blade. Flower solitary, terminal, showy. Sepals and lateral petals distinct, similar. Lip large, saccate, with two short spurs near the apex, hairy within. Column dilated, petal-like, bearing a lid-like anther just below the apex. Pollinia two in each sac, united, sessile on a broad gland. [*Calypso* Salisb.]

Beard of the lip yellow.

Beard of the lip white.

1. *C. bulbosa*.

2. *C. occidentalis*.

1. ***C. bulbosa*** (L.) House. Corm nearly globose, 1 cm. in diameter; scape 5-15 cm. high; leaf-blade rounded-ovate, 2-4 cm. long, nearly as wide, acute at the apex, rounded or subcordate at the base; flowers variegated, purple, pink and yellow; petals and sepals 10-15 mm long, with 3 purple lines; lip large, 15-20 mm long. *Calypso borealis* Salisb. Cold woods: Lab.—Me—Mich—Colo.—Calif—Alaska; Eu. Submont—Subalp. My-Je.

2. ***C. occidentalis*** (Holz.) Heller. Corm rounded-ellipsoid; plant closely resembling the preceding species, but the lip comparatively narrower and longer, usually fully 2 cm. long, and sepals and petals less strongly purple-veined. *Calypso bulbosa* f. *occidentalis* Holz. Cold woods: Calif.—Ida.—B.C. Submont.—Mont. Ap-Je.

17. **APLECTRUM** Nutt. ADAM AND EVE, PUTTY-ROOT.

Acaulescent perennial herbs, with a chain of corms, representing each a season's growth. Stem scape-like, leafless, a solitary long-petioled leaf being produced from the corm in the fall. Flowers in terminal racemes, showy. Sepals and lateral petals almost similar, narrow. Lip slightly clawed, spur-less, with 3 ridges. Fertile anther solitary, a little below the summit of the column. Pollinia 4.

1. *A. spicatum* (Walt.) B.S.P. Scape glabrous, 3-6 dm. high, with a few scales; leaf-blade ovate or elliptic, or obovate, 1-1.5 cm. long; flowers dull yellowish brown, streaked with purple, fully 2 cm. long; lip shorter than the petals, obtuse, somewhat 3-lobed; capsule oblong-ovoid, 2 cm. long. *A. hyemale* Nutt. Woods: Ont.—Ga.—Mo.—Sask. *Boreal*. My—Je.

18. CORALLORRHIZA R. Br. CORAL-ROOT.

Leafless saprophytic herbs, with coralloid roots. Stems scaly, colored. Flowers in terminal spikes. Sepals nearly equal, the lateral ones united with the foot of the column, and often forming a short spur, partly or wholly adnate to the top of the ovary. Lateral petals similar to the sepals. Lip broad, spreading, adnate to the base of the 2-edged or 2-winged column. Fertile anther solitary, terminal, lid-like. Pollinia 4, waxy, free.

Spur small, adnate to the ovary

Lip entire, ovate, sinuate; whole plant yellow.

Lip with 2 lobes or teeth below the middle; plant brownish, rarely yellowish.

Column about half as long as the petals; sepals erect.

Lip unspotted; teeth or lobes small; spur very small.

Lip spotted; lobes prominent; spur manifest

Column almost equalling the petals, sepals reflexed

Spur lacking.

Petals and sepals 12-14 mm. long, elliptic.

Petals and sepals 7-8 mm. long, oblong.

1. *C. ochroleuca*

2. *C. corallorrhiza*

3. *C. multiflora*

4. *C. mertensiana*

5. *C. striata*

6. *C. vreelandii*

1. *C. ochroleuca* Rydb. Stem 2-4 dm. high, not bulbous-thickened at the base; raceme 10-15-flowered; flowers 15-20 mm. long, light yellow, unspotted, petals and sepals 7-8 mm. long, oblong-lanceolate, acute, with prominent mid-vein. Woods: w Neb.—Colo.—Utah. *Submont.* Je—Jl.

2. *C. corallorrhiza* (L.) Karst. Stem glabrous, 1-3 dm. high, usually yellowish; racemes 3-7 cm. long, 3-12-flowered; flowers greenish yellow or greenish brown, about 1 cm. long; lip oblong, yellowish or whitish; spur a sack or small protuberance; capsule 8-12 mm. long. *C. innata* R. Br. Woods: N.S.—Ga.—Colo.—Alaska; Eu. *Submont.*—*Mont.* My—Je.

3. *C. multiflora* Nutt. Stem 2-5 dm. high, purplish, with many scales; racemes 10-30-flowered; flowers 12-18 mm. long, brownish purple; lip white, spotted and lined with purple, oval in outline, deeply 3-lobed, crenulate, the middle lobe longer; spur about 2 mm. long; capsule 15-20 mm. long. Woods: N.S.—Fla.—Calif.—Alaska. *Plain*—*Mont.* Je—Au.

4. *C. mertensiana* Bong. Scape 2-4 dm. high, glabrous, purple; raceme 10-20-flowered; flowers purplish; lip entire, broadly oblong, narrowed at the base, thin, concave; spur about 2 mm. long, the lower half free from the ovary; capsule fully 2 cm. long. Woods: Alaska—Mont.—Ida.—Calif. *Mont.* Je—Au.

5. *C. striata* Lindl. Stem stout, 2-5 dm. high, purple; raceme 10-25-flowered; flowers purple with dark veins; lip oval or obovate, entire, undulate, about as long as the petals; column half as long as the petals; capsule ellipsoid, reflexed, 15-20 mm. long. Woods: Ont.—N.Y.—Mich.—Wyo.—Calif.—B.C. *Submont.* My—Jl.

6. *C. vreelandii* Rydb. Stem rather stout, 2-4 dm. high, dark purplish brown; flowers 6-15, about 15 mm. long, in fruit drooping; sepals with 3 purple stripes; petals slightly broader and with 4 stripes; lip ovate, entire. Wet woods: Colo.—N.M. *Mont.*—*Subalp.* Je.

Subclass 2. **DICOTYLEDONES.**

Embryo mostly with 2 seed-leaves, if with only one seed-leaf, the first leaves opposite. Stem exogenous, *i. e.*, differentiated into pith, wood, and bark; fibro-vascular bundles arranged in concentric layers around the pith, the new bundles being formed between the wood and the bark. Leaves usually pinnately or palmately veined, with ramifying veins. Parts of the flowers mostly in 5's, less commonly in 4's or 2's, seldom in 3's.

FAMILY 30. **SALICACEAE.** WILLOW FAMILY.

Dioecious trees or shrubs, with soft wood and simple alternate leaves. Flowers in bracted aments, solitary in the axils of scale-like bractlets. Perianth represented by one or more glands or a cup-like disk. Stamens one or more. Pistil solitary, with 2-4 parietal placentae, becoming a dehiscent capsule; seeds numerous, bearing a tuft of hairs at the apex; endosperm wanting.

Bractlets incised, flowers with a cup-shaped disk, stamens usually more than 10, stigmas expanded, winter-buds with several scales 1. **POPULUS.**
Bractlets entire or denticulate, flowers with one or more glands; stamens 2-7, in most species only 2, stigmas narrow; winter-buds with but 1 scale each. 2. **SALIX.**

1. **PÓPULUS** (Tourn.) L. POPLAR, COTTONWOOD, ASPEN.

Trees, with furrowed bark and often resinous buds of more than one scale. Leaves petioled, usually with broad, toothed or even lobed blades, and caducous stipules. Flowers in drooping aments, bractlets membranous, lobed or fimbriate at the apex, usually caducous. Disk present, oblique, entire, toothed, or lobed. Stamens adnate to the disk; filaments distinct, glabrous; anthers purple, orange, or red. Ovary sessile in the disk; style short; stigmas 2-4, dilated. Ovules anatropous. Capsule opening by 2-4 valves.

Leaves not white-tomentose beneath, toothed or rarely entire.

Petioles strongly flattened laterally

Leaves suborbicular, acute or very short-acuminate, finely crenate or subentire. Leaf-blades with 2 conspicuous glands beneath at the base.

Leaf-blades not glandular at the base.

Leaves broadly deltoid, cordate, or ovate, abruptly acuminate, coarsely toothed, especially about the middle.

Cup of the pistillate flowers 6-8 mm broad

Pedicels equalling or exceeding the capsules; leaf-blades longer than broad; teeth few, less than 10 on each side.

Pedicels shorter than the capsules; leaf-blades usually broader than long; teeth more than 10 on each side, sometimes obscure.

Cup of the pistillate flowers less than 5 mm broad; teeth of the leaves many, more than 10 on each side; pedicels shorter than the capsule.

Leaves flabellate-cordate, with a broad, concave, entire sinus.

Leaf-blades ovate, rounded or cuneate at the base, which is more or less toothed; only the blades of the young shoots cordate.

Petioles terete or nearly so.

Petioles at least half as long as the blades; blades cordate, ovate, or broadly lanceolate

Leaves green on both sides, abruptly long-acuminate.

Leaves paler beneath, acute or somewhat acuminate.

Fruit sessile, usually 3-carpellary.

Ovary and capsule densely pubescent, subglobose.

8 **P. trichocarpa.**

- Ovary and fruit glabrous, but slightly warty, ovoid
- Fruit pedicelled, 2-carpellary, glabrous; capsule ovoid
- Twigs, petioles, and veins glabrous
- Twigs, petioles, and veins of the lower surface of the leaves more or less pubescent
- Petioles about one-third as long as the blade or less.
- Leaves cordate at the base
- Leaf-blades lanceolate, usually acute at the base.
- Leaves white-tomentose beneath, often lobed.
- 9 *P. hastata*
10. *P. balsamifera*
- 11 *P. candicans.*
- 12 *P. Tweedyi*
13. *P. angustifolia*
- 14 *P. alba.*

1. ***P. cercidiphylla*** Britton. A small tree, with light grayish bark; petioles 1.5-2 cm. long; leaf-blades orbicular or somewhat reniform, slightly cordate at the base, dull green, somewhat paler beneath, entire or slightly undulate, about 3.5 dm. wide. Hoback Basin, Wyo. *Submont.*

2. ***P. tremuloides*** Michx. A slender tree, with light green or whitish bark, up to 30 m. high; petioles 4-6 cm. long; leaf-blades rounded or subcordate at base, 2-6 cm. broad, green and glabrous, ciliate on the margin; bracts silky, deeply 3-5-cleft into linear lobes; stamens 6-12; stigma-lobes linear; capsule conic, warty. The western tree may be distinct, and if so should be known as *P. aurea* Tidestrom. QUAKING ASPEN. Cold places, sub-alpine forests: Newf.—N.J.—Tenn.—N.M.—Nev.—Alaska. *Submont.*—*Subalp.* Mr—My.

3. ***P. Wislizeni*** (S. Wats.) Sarg. A tree about 15 m. high, with gray trunk and yellow branches; petioles glabrous, 4-7 cm. long; leaf-blades truncate or broadly reniform, or sometimes broadly cuneate at the base; aments 5-10 cm. long; bracts light red, fringed, with linear lobes; capsule ovoid, papillose. COTTONWOOD. Valleys and river banks: Tex.—Colo.—Ariz.—n Mex. *Son.*—*Mont.* Mr—My.

4. ***P. Fremontii*** S. Wats. A tree occasionally 35 m. high, with dark brown trunk and gray branches; petioles 5-7 cm. long; blades broadly cordate-deltoid, with an open rounded sinus at the base, 4-7 cm. long, 5-10 cm. broad; aments 5-10 cm. long; capsule 8-12 mm. long. COTTONWOOD. Along rivers and in cañons: Calif.—s Utah—Ariz.—L. Calif. *Son.* F—Mr.

5. ***P. Sargentii*** Dode. A tree sometimes 30 m. high, with gray trunk and straw-colored or light yellow branches; petioles about as long as the blades; leaf-blades broadly deltoid or cordate, abruptly acuminate at the apex, glabrous and shining, 5-10 cm. long; aments 5-8 cm. long; capsules ovoid, muricate, on pedicels 4-6 mm. long. *P. occidentalis* Rydb. WESTERN or RIVER COTTONWOOD. River bottoms: Sask.—Kans.—Ariz.—Alta. *Plain*—*Submont.* Mr—Ap.

6. ***P. Besseyana*** Dode. A tree about 10 m. high, with gray trunk and yellowish terete branches; petioles about as long as the leaf-blades; blades abruptly acuminate, 5-10 cm. long, glabrous and shining, slightly paler beneath; aments 7-8 cm. long; pedicels shorter than the fruit; capsule ovoid, about 5 mm. long, muricate, 3-valved; stigma dilated. Valleys: Mont.—Ida. *Submont.* Ap—Je

7. ***P. acuminata*** Rydb. A tree up to about 20 m. high, with brownish or gray trunk and straw-colored branches, petioles 3-7 cm. long; leaf-blades rhombic-lanceolate to ovate, usually cuneate at the base, finely crenate, green and glabrous on both sides; aments 3-5 cm. long, or the pistillate in fruit 10-15 cm.; capsule ovoid, blunt, 6-8 mm. long, papillose; pedicels in fruit 3-5 mm. long. RYDBERG's or SMOOTH-BARKED COTTONWOOD. River banks: Sask.—Tex.—Ariz.—Mont. *Plain*—*Submont.* Ap—My.

P. acuminata* × *Sargentii Sarg. Intermediate between the parents, with the fine serrations, cuneate base, and texture of the leaves of *P. acuminata*, but with the broader leaves and darker branchlets of *P. Sargentii*. *P. Andrewsii* Sarg. Colo

8. ***P. trichocarpa*** T. & G. A tree sometimes 60-70 m. high, with gray trunk and orange or gray, pubescent branches; petioles 2-6 cm. long; leaf-blades broadly ovate to ovate-lanceolate, acute or short-acuminate at the apex, cordate, truncate, or rounded at the base, 8-12 cm. long, finely crenate, dark green above, pale beneath, usually pubescent when young; aments 4-7 cm. long. WESTERN BALSAM POPLAR. River banks: Alaska—Mont.—Calif. *Plain*—*Submont.* Ap—My.

9. *P. hastata* Dode A tree 10-20 m. high, with gray trunk and branches; petioles 3-4 cm. long, glabrous; leaf-blades ovate, ovate-deltoid, or subcordate, dark green above, pale beneath, mostly acuminate, rounded or cordate at the base, crenulate, 6-10 cm. long; aments 5-12 cm. long; cup 4-5 mm. wide. Valleys: Alta.—Mont.—Ida. Submont.—Mont. Ap-Je.

10. *P. balsamifera* L. A tree sometimes 25 m. high, with reddish gray trunk and light brown or gray branches; petioles 2-5 cm. long; leaf-blades ovate to ovate-lanceolate, dark green and shining above, pale beneath, acute or acuminate at the apex, rounded or cuneate at the base, crenulate, 7-12 cm. long; aments 5-10 cm. long. BALSAM POPLAR. Along streams and lakes: Newf.—N.Y.—Colo.—Nev.—Alaska. Submont.—Mont. Ap.

11. *P. candicans* Michx. A tree sometimes 30 m. high, with gray trunk and round branches, pubescent when young, in age glabrate; petioles pubescent or ciliate; leaf-blades broadly ovate, acute or acuminate at the apex, cordate or truncate at the base, 6-15 cm. long, 3-12 cm. wide, dark green above, pale beneath, crenate; aments 6-12 cm. long; capsule oblong-ovoid, smooth, short-stalked. BALM OF GILEAD. Roadsides and river banks: Newf.—N.J.—S D.—Alta.—Alaska. Boreal. Ap-My.

12. *P. Tweedyi* Britton. A small tree, with yellowish twigs; petioles stout, 5-12 mm. long; leaf-blades ovate to nearly round, acute, finely crenate, cordate or rounded at the base, 3-7 cm. long, dark green above, paler beneath; aments 3-4 cm. long, in fruit 6 cm.; capsules ovoid, densely papillose, 4 mm. long; pedicels about 1 mm. long. CORRONWOOD. River bottoms: Wyo. Submont.

13. *P. angustifolia* James. A slender tree, sometimes 20 m. high, with upright branches and greenish bark; petioles 6-12 mm. long; leaf-blades lanceolate to ovate, acute or gradually acuminate at the apex, cuneate, rounded or rarely subcordate at the base, green above, paler beneath, finely crenate, 5-12 cm. long; aments 2-6 cm. long; capsule ovoid, rugose. *P. coloradensis* Dode. *P. fortissima* Nels. & Mach. NARROW-LEAVED or BLACK CORRONWOOD. Along streams: Sask.—Neb.—N.M.—Ida.; n Mex. Plain—Mont. Ap-My.

14. *P. alba* L. A large tree, sometimes 35 m. high, with light gray bark; petioles shorter than the blades, subterete; leaf-blades densely white-tomentose on both sides, becoming glabrate and dark green above, broadly ovate or orbicular in outline, 3-5-lobed and irregularly toothed, 6-10 cm. long; aments 3-6 cm. long; capsules elliptic, subsessile. WHITE or SILVER POPLAR. In yards and along roadsides: N.B.—Va.—N.M.—Utah; cult. and escaped, native of Eurasia. Mr-My.

2. *SALIX* (Tourn.) L. WILLOW.

Trees or shrubs, usually with flaky bark and slender, flexible twigs; bud of only one scale. Leaves alternate, petioled or subsessile, pinnately veined, usually finely toothed. Bractlets of aments entire or rarely denticulate, with one or more gland-like nectaries at the base of the stamens or the pistil. Stamens 1-7, usually 2; anthers usually yellow. Ovary more or less stipitate; stigmas 2, often 2-cleft, with narrow branches. Capsule dehiscent at the apex into 2 valves.

Capsule glabrous, or slightly silky when young in nos. 12, 14, and 16.

Filaments hairy, at least below; bractlets caducous, light yellow; style very short, obsolete, or none, evident only in nos 16 and 18, aments in all ours on short leafy branches

Stamens 3-7, stipe slender, 2-5 times as long as the nectaries.

Petioles without glands, leaves remotely serrulate, thin.

Petioles with glands; leaves densely glandular-serrate, firmer.

Stamens 2, stipes usually very short.

Leaf-blades lanceolate, acuminate.

Leaf-blades linear or linear-lanceolate, acute, rarely acuminate.

Filaments glabrous, bractlets persistent, rarely light yellow.

Trees, or erect or ascending shrubs, several dm high; leaf-blades more than 1 cm. long; style evident

Depressed prostrate shrubs, 1-3 cm. high; leaf-blades less than 1 cm. long; style none.

I. AMYGDALINAE.

II. PENTANDRAE.

III. ALBAE.

IV. LONGIFOLIAE.

V. CORDATAE.

VI. RETUSAE.

Capsule hairy.

Filaments hairy; bractlets caducous; leaf-blades linear to lanceolate, not very velvety

IV. LONGIFOLIAE.

Filaments glabrous, or if somewhat hairy, leaf-blades oval or orbicular, very velvety, bractlets persistent.

Capsule rostrate, distinctly stipitate; style none or short, always shorter than the stipe.

Stipe equalling or exceeding the bractlets; style 0.5 mm. long or less.

VII. ROSTRATAE.

Stipe shorter than the bractlets; style usually 1 mm. long.

VIII. CAPREAE.

Capsule scarcely rostrate, subsessile or, if stipitate, stipe shorter than the style.

Style evident, at least 0.5 mm. long.

Leaves permanently silky or tomentose beneath.

IX. ARGENTAE

Leaves neither silky-white nor tomentose beneath.

X. ARCTICAE

Style none, depressed or low shrubs, with entire strongly reticulate leaves

XI. RETICULATAE

I. AMYGDALINAE.

Bractlets entire.

Leaves narrowly lanceolate; petioles short.

Bark of twigs brownish; aments long and lax, leaf-blades broadest below the middle, long-acuminate.

1 *S. nigra*

Bark of twigs light yellow; aments short and dense, leaf-blades usually broadest at or above the middle, short-acuminate.

2 *S. Wrightii*.

Leaf-blades broadly lanceolate, petioles slender, 6-15 mm. long.

3. *S. amygdaloides*.

Bractlets denticulate.

4. *S. laevigata*

II. PENTANDRAE.

Leaves narrowly oblanceolate, acute, drying blackish; bractlets of the staminate aments ovate, and of pistillate lanceolate, neither toothed.

5. *S. erythrocoma*.

Leaves lanceolate to ovate; bractlets of the staminate aments obovate or spatulate, usually toothed, those of the pistillate aments oblong.

Bractlets densely white-villous; stipe of the capsules scarcely twice as long as the nectaries.

6 *S. serissima*.

Bractlets sparingly hairy; stipe of the capsules 3-4 times as long as the nectaries

Leaves ovate-lanceolate or ovate; glands of the leaves very prominent; those on the petioles often stalked.

7 *S. lucida*.

Leaves lanceolate, glands of the leaf-blades not very prominent; those on the petioles always sessile.

Leaf-blades usually less than 1 dm. long, green on both sides; aments short.

8 *S. Fendleriana*

Mature leaf-blades often 1 dm. long, glaucous beneath; aments elongate

9 *S. Lyallii*.

III. ALBAE.

One species.

10. *S. alba*.

IV. LONGIFOLIAE.

Capsule glabrous or slightly silky when young.

Leaves with close serrations, glaucous and prominently veined beneath

11. *S. melanopsis*.

Leaves entire or with distant serrations, neither glaucous nor strongly veined beneath.

Styles none

Leaves permanently silky.

Leaves 3-5 mm. wide; ovary without a hairy swelling at the apex.

12. *S. exigua*

Leaves 2-3 mm. wide; ovary with a hairy swelling at the apex.

13. *S. stenophylla*

Leaves glabrous in age, or nearly so.

Leaves linear-lanceolate; bractlets ovate or obovate, obtuse.

14. *S. interior*

Leaves narrowly linear; bractlets lanceolate, acute

15. *S. linearifolia*.

Styles evident; aments dense; bractlets densely silky.

16. *S. sessilifolia*.

Capsule permanently densely pubescent

Stigma sessile, leaves entire or nearly so

17. *S. argophylla*

Stigma on a distinct style, which is 0.5 mm. long; leaves dentate

18. *S. macrostachya*

V. CORDATAE.

Leaves white-tomentose or white-villous beneath.

Leaves entire, or minutely denticulate, aments 3-4 cm. long; bractlets silky-pilose

Leaves permanently appressed-silky.

19. *S. Sandwergii*

Leaves in age glabrous and shining, at least above.

20. *S. lasiolepis*.

Leaves usually crenate, villous, 3-8 cm. long; aments 3-6 cm. long; bractlets densely villous

21. *S. Hookeriana*.

Leaves glabrous or hairy, but not densely white-pubescent beneath

Branches without a bloom.

Capsule long-stipitate; stipe in fruit 1.5-6 mm. long, equalling or exceeding the bractlets, style 0.5 mm. long or less

Leaves dark green above; young branches not light yellow; aments on short leafy branches.

- Mature leaves rather thin, dull, length of the blade less than three times its width. 22. *S. balsamifera*.
 Mature leaves firm, dark green, shining above, pale beneath; length of the blade three times the width or more.
 Stipe in fruit 2-4 times as long as the bractlets; mature leaves slightly serrate. 23. *S. Mackenziana*.
 Stipe slightly if at all exceeding the bractlets.
 Mature leaves lanceolate, strongly serrate. 24. *S. cordata*.
 Mature leaves oblong or oblanceolate, entire. 25. *S. pedicularis*.
 Leaves yellowish green; young branches light yellow; aments naked or subtended by a few small leaves.
 Leaves usually long-acuminate, serrate. 26. *S. lutea*.
 Leaves acute or rarely short-acuminate, entire or indistinctly crenulate. 27. *S. Watsonii*.
 Capsule short-stipitate or subsessile; stipe in fruit less than 1.5 mm. long and much shorter than the bractlets, style 0.5-1 mm. long.
 Leaves more or less dentate, rarely subentire.
 Young leaves and twigs rather densely pubescent with long white hairs; the former glandular-denticulate or dentate. 28. *S. Barklayi*.
 Bractlets fuscous. 29. *S. commutata*.
 Bractlets yellowish or light brown.
 Young leaves glabrous or slightly pubescent.
 Capsules 7-8 mm. long; leaf-blades broadly ovate or obovate, glandular-dentate. 30. *S. Tweedyi*.
 Capsule 4-6 mm. long; leaf-blades narrowly obovate to lanceolate.
 Leaves dark green above, not reticulate.
 Leaves blackening in drying, finely glandular-dentate. 31. *S. conjuncta*.
 Leaves not blackening in drying.
 Leaves thin, ovate, elliptic, or obovate, light green and dull above; capsule ovoid. 32. *S. padophylla*.
 Leaves thick, firm, shining above; capsule lance-ovoid.
 Style 0.5-1 mm. long; aments on short leafy branches, 2-3 cm. long. 33. *S. monticola*.
 Style 1-1.5 mm. long; aments subsessile, 3-4 cm. long. 34. *S. curtiflora*.
 Leaves yellowish green, conspicuously reticulate, thin.
 Leaves acute or acuminate, serrate. 35. *S. pseudomyrsinites*.
 Leaves obtuse or rounded at the apex, crenate. 36. *S. myrtillofolia*.
 Leaves entire, linear, lanceolate, oblanceolate, or oblong; aments subsessile, naked. 37. *S. Wolffii*.
 Leaves permanently silky; a low shrub. 38. *S. lasiolepis*.
 Leaves glabrous in age; tree or tall shrub. 39. *S. irrorata*.
 Branches with a bloom, purple. 39. *S. Dodgeana*.
- VI. RETUSAE.
- One species.
- VII. ROSTRATAE.
- Leaves linear to lanceolate or oblanceolate.
 Leaves sharply serrate, narrowly lanceolate, 5-10 cm. long. 40. *S. petiolaris*.
 Leaves entire or nearly so, linear, less than 5 cm. long.
 Leaves more or less silky, oblanceolate; branches purplish, usually with a bloom. 41. *S. Geyeriana*.
 Leaves not silky, linear, branches without a bloom. 42. *S. gracilis*.
 Leaves ovate to obovate or broadly oblanceolate.
 Bracts fuscous, obovate or cuneate. 43. *S. discolor*.
 Bracts yellow, linear-oblong or lanceolate.
 Mature leaves thin, glabrous. 44. *S. perrostrata*.
 Mature leaves firm, pubescent or tomentose beneath. 45. *S. Bebbiana*.
- VIII. CAPREAE.
- Capsule 8-10 mm. long, at least the staminate aments not leafy-bracted.
 Leaves obovate, entire or nearly so, densely silky and fulvous, almost velutinous when young, in age glabrate above, bractlets fuscous, obovate. 46. *S. Scouleriana*.
 Leaves oblanceolate, closely and finely serrulate, puberulent when young; bractlets yellow, oblong. 67. *S. MacCalliana*.
 Capsule 6 mm. long or less; aments leafy-bracted. 47. *S. Lemmonii*.
 Bractlets black, thinly pilose; style about 1 mm. long; leaves glabrate in age. 48. *S. alaxensis*.
 Bractlets brownish, villous; style about 0.5 mm. long; leaves silvery-silky beneath. 54. *S. argyrocarpa*.
- IX. ARGENTEA.
- Aments more than 1 cm. broad; ovary over 5 mm. long.
 Leaves obovate, ovate, or broadly oblanceolate.
 Bractlets obovate, fuscous, leaves usually obovate.
 Twigs white-villous; leaf-blades entire.

- Twigs puberulent, leaf-blades usually glandular-denticulate
 Bractlets oblong, yellow; leaf-blades usually broadly oblanceolate 49. *S. Barrattiana*
 63. *S. Seemannii*
 Leaves oblanceolate or oblong-lanceolate, bractlets oblong
 Leaves silvery-silky beneath, not strongly reticulate, bractlets black
 50. *S. bella*
 Leaves white-tomentose beneath, strongly reticulate; bractlets brown
 51. *S. candida*
 Aments less than 1 cm. broad; ovary less than 5 mm. long.
 Leaves broadly obovate
 Twigs puberulent, bractlets light brown, stamen 1. 52. *S. sitchensis*.
 Twigs glabrous; bractlets blackish, stamens 2. 53. *S. Drummondiana*
 Leaves oblong, lanceolate, or oblanceolate
 Bractlets yellow or brown, stipes 3-4 times as long as the nectaries; style less than
 0.5 mm. long 54. *S. argyrocarpa*
 Bractlets fuscous; stipes less than twice as long as the nectaries.
 Style about 0.5 mm. long; bractlets obtuse 55. *S. arbusculoides*
 Style 1-2 mm. long
 Branches without a bloom; leaves tomentose beneath
 56. *S. pellita*
 Branches with a bloom, leaves white-silky beneath
 Aments peduncled and leafy-bracted 57. *S. subcoerulea*
 Aments sessile and naked 58. *S. pachnophora*

X. ARCTICAE.

- Aments on leafy peduncles
 Leaves grayish villous on both sides, less so on the upper
 Twigs white-villous or silky, branches yellow or grayish.
 Leaves villous; capsules densely pubescent 59. *S. brachycarpa*
 Leaves silky, capsules finely and sparingly pubescent
 60. *S. idahoensis*
 Twigs puberulent, branches usually purplish.
 Bractlets black or with blackish tips
 Leaves oblong, 2-3 cm. long, bractlets obovate, branches divergent
 61. *S. pseudolapponum*
 Leaves oblanceolate or obovate, 3-6 cm. long, bractlets oblong, branches
 ascending 62. *S. glaucops*
 Bractlets yellow, oblong 63. *S. Seemannii*
 Leaves glabrate or when young covered with white hairs parallel to the midrib
 Shrubs not creeping, although often depressed
 Leaves broadly oval, often minutely glandular-dentate 64. *S. subcordata*
 Leaves narrower
 Leaves oblong or oblanceolate, or ovate
 Leaves 2-4 cm. long; capsule 3-5 mm. long
 Bractlets yellow or brown, oblong, leaves elliptic or oblanceolate,
 thin, darkening in drying, twigs purple 65. *S. desertorum*
 Bractlets fuscous at the apex; leaves oblong, not blackening in
 drying 61. *S. pseudolapponum*
 Leaves 4-6 cm. long.
 Bractlets fuscous, leaves elliptic or oblong, obtuse or acute, usually
 reticulate; glabrous only in age. 62. *S. glaucops*.
 Bractlets yellow or brown, leaves usually short-acuminate, glabrous
 except when very young, not reticulate
 Leaves entire or sparingly glandular-denticulate, oblanceolate
 66. *S. Austinae*
 Leaves finely serrulate, elliptic, lanceolate, or oblanceolate
 67. *S. MacCalliana*,
 68. *S. saskatchewanae*
 Leaves linear-lanceolate
 Shrubs creeping; arctic or alpine
 Leaves obovate or oblanceolate, aments many-flowered
 69. *S. petrophila*
 Leaves narrowly oblanceolate, aments few-flowered 70. *S. cascadenis*.
 Aments naked, from lateral buds.
 Leaves oblanceolate, strongly veined. 71. *S. Nelsonii*
 Leaves elliptic, not strongly veined. 72. *S. chlorophylla*.

XI. RETICULATAE.

- Leaves covered beneath with long white silky hairs. 73. *S. Fernaldii*
 Leaves at least in age not silky
 Leaf-blade over 1 cm. long; aments comparatively many-flowered.
 Filaments very hairy on the lower part, leaves strongly reticulate, bracts broadly
 obovate, fuscous, the upper portion almost glabrous.
 74. *S. orbicularis*
 Filaments almost glabrous; leaves less strongly reticulate, bracts cuneate-oblong,
 yellow, almost glabrous. 75. *S. saximontana*
 Leaf-blade 1 cm. or less long, aments few-flowered, bractlets yellow, almost glabrous.
 76. *S. nivalis*

1. *S. nigra* Marsh. A tree 10-20 m., rarely 30-40 m. high; leaf-blades 6-12 cm. long, bright green on both sides, finely serrate, usually more or less falcate, aments appearing with the leaves, the staminate ones 4-6 cm. long; bractlets ovate, finely villous; pistillate aments 4-8 cm. or in fruit 10-12 cm. long; bractlets oblong, finely pubescent; capsule about 3 mm. long; stipe 1-1.5 mm. long. BLACK WILLOW. River banks and wet places: N.B.—Fla.—Tex.—N.D. *Plain*. Ap-My.

2. *S. amygdaloides* × *nigra* Glattf. This hybrid is intermediate between the two parents, with narrower leaves, less glaucous beneath, and with shorter petioles than in *S. amygdaloides*, but broader leaves and with longer petioles than in *S. nigra*. In the eastern part of the range.

3. *S. Wrightii* Anders. A tree 8-10 m. high; bark of the stem flaky, gray; leaf-blades 5-15 cm. long, light and usually yellowish green above, paler and sometimes glaucous beneath, finely serrate; aments 2-7 cm. long; bractlets of the staminate aments ovate, finely pubescent, those of the pistillate ones oblong; capsule about 4 mm. long; stipe 1-2 mm. long. River banks: Tex.—Colo.—Nev.—s Calif.; n Mex. *Son.*—*Submont.* Ap-My.

4. *S. amygdaloides* Anders. A tree up to 20 m. high; twigs yellowish; leaf-blades 8-12 cm. long, acuminate, finely serrate, paler and somewhat glaucous beneath; aments 3-5 cm. long; bractlets oblong or lanceolate, somewhat pubescent; capsule about 5 mm. long; stipe 1-2 mm. long. PEACH-LEAVED WILLOW. River and lake banks: Que.—N.Y.—Mo.—Tex.—Ariz.—Ore.—B.C. *Plain*—*Submont.* Ap-My.

5. *S. laevigata* Bebb. A tree 5-15 m. high; trunk with brown fissured bark; twigs yellowish, pubescent when young; leaves lanceolate or lance-oblong, acute or acuminate, 7-15 cm. long, dark green and glossy above, pale or glaucous beneath, minutely serrate; aments 5-10 cm. long; bractlets villous, dentate, in the staminate aments obovate, in the pistillate ones narrower; stipe 3 to 4 times as long as the glands. Along streams: Ore.—Utah—Calif. *Son.* Ap-Je.

6. *S. erythrocoma* Barrett. A shrub or small tree (?); bark of the twigs dark, purplish brown; leaf-blades 3-5 cm. long, finely glandular-serrate, reddish pubescent when young, in age glabrate on both sides; aments 2-4 cm. long. *S. arguta erythrocoma* Anders. Banks of rivers and lakes: Man.—B.C.—Mack.

7. *S. serissima* (Bailey) Fern. A shrub 2-4 m. high; leaf-blades lanceolate, acute or acuminate, when mature dark green, shining above, pale beneath, thick and firm, 4-10 cm. long, closely and finely glandular-serrate; aments 1-2.5 cm. long; capsules 7-12 mm. long. *S. pallescens hirtsquama* Anders. AUTUMN WILLOW. Swamps: Mass.—N.J.—Wis.—Minn.—Sask. *Boreal.* My-Jl.

8. *S. lucida* Muhl. A tall shrub or sometimes a tree 6-8 m. high; leaf-blades mostly abruptly long-acuminate, acute or rounded at the base, sharply glandular-serrate, green and shining, slightly paler beneath, 7-12 cm. long; aments 2-5 cm., or the pistillate even 7 cm. long; bractlets sparingly pubescent; capsule 5 mm. long. SHINING WILLOW. Swamps and banks: Newf.—N.J.—Ky.—Neb.—Alta. *Boreal.* Ap-My.

9. *S. Fendleriana* Anders. A shrub or small tree, rarely 10 m. high; leaf-blades lanceolate, long-acuminate, finely glandular-dentate, acute at the base, 6-15 cm. long; aments 2-5 cm. long; bractlets toothed towards the apex; stamens 5-9; capsule 5 mm. long. *S. lasiandra caudata* (Nutt.) Sudw. Along mountain streams: B.C.—Alta.—(Black Hills) S.D.—N.M.—Calif. *Submont.*—*Mont.* Ap-My.

10. *S. Lyallii* (Sarg.) Heller. A tree sometimes 20 m. high; bark brown or of the twigs yellow; leaf-blades broadly lanceolate, more or less acuminate, finely glandular-serrate, 6-20 cm. long; aments 4-8 cm. long, or the pistillate ones sometimes 10 cm. long; bractlets toothed above; stamens 5-8; capsule about 6 mm. long. *S. lasiandra Lyallii* Sarg. River and lake banks: B.C.—Yukon—Mont.—Calif. *Submont.* Ap-My.

11. *S. alba* L. A large tree sometimes 30 m. high; leaf-blades serrulate, silky-pubescent on both sides when young, pale beneath, 5-12 cm. long; aments on short leafy branches, 3-6 cm. long, 4-5 mm. thick; bractlets of the staminate

aments obovate, those of the pistillate ones lance-oblong; capsule almost sessile, 4-5 mm. long. **WHITE WILLOW.** Moist ground, along streams: N.B.—Pa.—Colo.; escaped from cultivation, native of Eu. *Plain.* Ap—My.

11. *S. melanopsis* Nutt. A shrub or small tree; bark chestnut-brown; young branches puberulent; leaf-blades oblanceolate or elliptic, subsessile, about 5 cm. long, 1 cm. wide, silky-hairy when young, blackening in drying, somewhat glaucous, finely serrate; aments at the end of leafy branches, 5-7 cm. long, cylindrical; bractlets linear-oblong, more or less erose; capsule lanceolate, glabrous. **DUSKY WILLOW.** River banks: B.C.—Mont.—Ore. *Submont.* My—Jl.

12. *S. exigua* Nutt. A shrub or small tree sometimes 6-7 m. high; twigs yellowish or light brown, silky-pubescent when young; leaf-blades linear to narrowly linear-lanceolate, 2-8 cm. long, yellowish, silky; staminate aments 2-6 cm., the pistillate ones 3-5 cm. long; bractlets of the former obovate, of the latter broadly lanceolate; capsule elongate-ovoid, slightly silky when young, soon glabrate, 4-5 mm. long. *S. lutescens* Rydb. **SANDBAR WILLOW.** Sand-bars: Sask.—Okla.—Ariz.—B.C.—Ore. *Plain—Mont.* My—Jl.

13. *S. stenophylla* Rydb. A shrub 2-5 m. high; young shoots silvery-pubescent; leaves narrowly linear, 3-7 cm. long, acute, entire or minutely and distantly denticulate, silky-strigose; pistillate aments 3-4 cm. long; bractlets oblanceolate; capsule glabrous, about 6 mm. long; staminate aments 2-3 cm. long; bractlets more obtuse and more villous. River banks: Colo.—N.M.—Ariz. *Plain—Submont.* My—Jl.

14. *S. interior* Rowley. A shrub 1-4 m. high, occasionally a tree 6-9 m. high; twigs pubescent when young; leaf-blades 6-10 cm. long, less than 1 cm. wide, lance-linear, remotely dentate; aments 2-5 cm. long; bractlets glabrous or hairy toward the base, ovate or obovate, rarely oblong; capsule appressed-silky when young, soon glabrate. *S. longifolia* Muhl. **SANDBAR WILLOW.** River banks and shores: Que.—Va.—La.—Tex.—Sask. *Plain.* Je—Jl.

15. *S. linearifolia* Rydb. A low shrub, with reddish bark; leaf-blades narrowly linear, 4-10 cm. long, remotely dentate; aments loosely flowered, 3-4 cm. long; bractlets linear-lanceolate, acute, almost glabrous; capsule almost glabrous, 3-4 mm. long. *S. rubra* Richards. *S. tenerrima* (Howell) Heller. Sand-bars: Sask.—Okla.—Colo.—Wash. *Plain.* My—Je.

16. *S. sessilifolia* Nutt. A shrub or small tree sometimes 10 m. high; young branches canescent; leaf-blades linear-lanceolate to linear or oblong, 5-10 cm. long, sessile, obscurely and remotely denticulate or entire, silvery-canescens when young, in age more glabrate; aments 6-8 cm. long, nearly 1 cm. thick, often several together; capsule silky when young, glabrate in age. Sand-bars. (? Mont.)—Colo.—Calif.—Wash. *Submont.* Je—Jl.

17. *S. argophylla* Nutt. A tree or large shrub, usually about 5 m. high, young twigs yellow and puberulent, soon glabrate; leaf-blades narrowly linear-lanceolate, about 5 cm. long, sessile, densely white-silky on both sides; aments 3-5 cm. long, 1-2 cm. thick, often in pairs or threes; bractlets of the staminate aments oblong and obtuse, those of the pistillate aments lanceolate and acute, capsule densely silky, sessile. River banks: Mont.—Tex.—Calif.—Wash. *Plain—Submont.* My—Jl.

18. *S. macrostachya* Nutt. A shrub or small tree 1-6 m. high; twigs densely villous; leaf-blades linear-oblanceolate, about 5 cm. long, sessile, densely white-villous; aments often several together, 2-3 cm. long, densely flowered, bractlets densely villous all over, oblong; capsule densely villous, sessile. River banks: Calif.—Ida.—B.C. *Submont.* My—Jl.

19. *S. Sandbergii* Rydb. A shrub or small tree; branches chestnut-brown, leaves oval or elliptic, 2-4 cm. long, silky on both sides, grayish above, silvery beneath; pistillate aments sessile, naked, 4 cm. long; bractlets purple, obovate-spatulate, 3 mm. long, white-pilose; capsule glabrous, 4-5 mm. long; style about 1.5 mm. long; style about 0.5 mm. long. *S. boiseana* A. Nels. Valleys: Ida. *Submont.* Ap—Je.

20. *S. lasiolepis* Benth. A tree 3-20 m. high, with grayish brown, smooth bark; leaves oblanceolate, 10-15 cm. long, often obtuse, more or less short-villous when young, in age glabrous and shining above, glaucous or ferruginous beneath, subcoriaceous in age; aments sessile or nearly so; bractlets rounded, dark, crisp-villous; filaments slightly united at the base; capsule glabrous; stipe short; style about 1 mm. long. Along streams: Calif.—Utah—Ia.—Wash. *Sen. Mr-Je.*

21. *S. Hookeriana* Barrett. A shrub or tree up to 16 m. high; twigs densely velvety-canescens when young; leaf-blades broadly obovate or oval, white-pubescent when young, in age dark green and more glabrate above, white-villous beneath; aments subsessile, naked or nearly so, bractlets obovate, fuscous, but usually hidden by the dense white-villous pubescence; capsule about 5 mm. long; stipe short; style 0.5-1 mm. long. River banks: Sask.—Ore.—B.C. *Submont. Ap-My.*

22. *S. balsamifera* (Hook.) Barratt. Usually a shrub, about 3 m. high, sometimes a small tree up to 8 m. high; leaf-blades thin, ovate, oval, or obovate, acute or obtuse at the apex, rounded or subcordate at the base, dark green above, glaucous beneath, 5-8 cm. long; aments 2-5 cm. long; bractlets persistent, brownish or yellowish, silky-villous; capsule 6-8 mm. long; stipe about 3 mm. long, style very short. *S. pyrifolia* Anders. *P. Columbiæ* Nels. & Macb. *BALSAM WILLOW.* Swamps: Lab.—N.Y.—Minn.—Mont. *My.*

23. *S. Mackenziana* Barratt. A small tree or shrub, sometimes 10 m. high; bark brown, glabrous; leaf-blades oblanceolate or lanceolate, 5-10 cm. long, acuminate at the apex, crenate or nearly entire, dark green above, pale beneath, aments 4-6 cm. long; bractlets obovate, hairy towards the base; capsule glabrous, 5-7 mm. long; stipe 3-4 mm. long; style about 0.5 mm. long. *DIAMOND WILLOW.* Along streams: Sask.—Man.—Ia.—Calif.—B.C.—Mack. *Submont. Ap-Je.*

24. *S. cordata* Muhl. A shrub 1.5-4 m. high; leaf-blades from oblong-lanceolate and subcordate at the base to narrowly lanceolate and acute at the base [var. *angustata* (Pursh.) Anders., the form found in the Rocky Mountains], often somewhat silky-pubescent when young; staminate aments about 2 cm. long, the pistillate ones 4-6 mm. long in fruit; bractlets fuscous, white-silky; capsule glabrous, 6-7 mm. long; stipe 1-2 mm. long; style minute. *HEART-LEAVED WILLOW.* Wet ground: N.B.—Va.—Colo.—Calif.—B.C. *Plain—Mont. Ap-My.*

25. *S. pedicellaris* Pursh. A shrub 1 m. high or less; blades oblong, elliptic or sometimes oblanceolate, obtuse, entire, 2-4 cm. long, 8-16 mm. wide; aments about 2 cm. long; bractlets obtuse, slightly villous; capsule glabrous, about 5 mm. long; stipe about 2 mm. long; style minute. *S. myrtillodes* Am. auth., not L. *BOG WILLOW.* In bogs: N.B.—N.J.—Ia.—Wash.—B.C. *Mont. Ap-My.*

26. *S. lutea* Nutt. A shrub or small tree 5-6 m. high, with gray bark; leaf-blades lanceolate, 3-7 cm. long, more or less acuminate, somewhat pubescent when young; aments subsessile, 2-5 cm. long; bractlets brownish, white-villous; capsule about 5 mm. long; stipe 1-2 mm. long; style about 0.5 mm. long. *YELLOW WILLOW.* River banks and wet places: Man.—Neb.—Utah—Mont.—Alta. *Submont.—Mont. My-Je.*

27. *S. Watsonii* (Bebb) Rydb. A shrub or small tree 4-7 m. high; blades lanceolate, short-acuminate or acute, 3-7 cm. long; aments 2-3 cm. long, almost sessile; capsule ovate, about 6 mm. long; stipe in fruit often 2 mm. long; style about 0.5 mm. long. *S. flava* Rydb. River banks: Mont.—N.M.—Calif. *Submont. My-Je.*

28. *S. Barklayi* Anders. A tall shrub 1-4 m. high; leaf-blades obovate, ovate or oval, 2-5 cm. long, acute or short-acuminate, more or less glaucous beneath; aments on short leafy branches, 2-3 cm. long, 8-10 mm. thick; bractlets oblong, obtuse, densely white-villous; capsule about 6 mm. long, subsessile; style about 1 mm. long. Mountain meadows: Alaska—Wash.—Mont.; (Gaspé Peninsula) Que. *Subalp.—Alp. My-Au.*

29. *S. commutata* Bebb. A diffuse shrub 1-3 m. high; branches villous when young; leaves broadly oblanceolate or oblong, abruptly pointed; aments on short leafy branches, 2-4 cm. long; bractlets woolly; capsule about 5 mm. long, greenish or reddish; stipe short; style about 1 mm. long. Alpine and sub-alpine bogs: Ore.—Ida.—B.C. *Mont.*—*Alp.* Jy.—Au.

30. *S. Tweedyi* (Bebb) Ball. A tall shrub; twigs at first pubescent with gray hairs; leaf-blades acute or obtuse at the apex, from acute to subcordate at the base, yellowish green above, paler beneath; aments sessile and naked, appearing before the leaves, 4-6 cm. long; bractlets obovate, black, white-silky, capsule green; stipe 1 mm. long; style 1.5-2.5 mm. long. Mountains: *Mont.*—Wyo. Je.—Jl.

31. *S. conjuncta* Bebb. A shrub 1-4 m. high; leaf-blades elliptic or obovate, 3-4 cm. long, or on the young shoots 5-10 cm. long, acuminate or acute at the apex, acute or rounded at the base, glabrous or slightly floccose when young; aments on leafy peduncles, 3-5 cm. long; bractlets dark, acute, white-villous; stipe and style about 1 mm. each. Wet mountain meadows: Wash.—*Mont.*—Alaska. *Subalp.* Jl.—Au.

32. *S. padophylla* Rydb. A shrub 1-7 m. high; leaf-blades oval or broadly elliptic, crenate, short-acute or obtusish, rounded at the base, 3-5 cm. long; pistillate aments 3-4 cm. long, densely flowered, borne on very short branches; bractlets obovate, fuscous, covered on the outside with white wool; capsule about 6 mm. long; style about 1.5 mm. long; staminate aments almost sessile, 2-3 cm. long. *S. padifolia* Rydb., not Anders. CHERRY WILLOW. River banks: N.M.—*Mont.*—Utah. *Submont.*—*Mont.* My.—Je.

33. *S. monticola* Bebb. A shrub 2.5-3.5 m. high; leaf-blades lanceolate to obovate, acute or acuminate, 8-15 cm. long, glabrous, pale or glaucous beneath, serrate or crenate; aments thick, 2-3 cm. long; bractlets oval, silky with long hairs; capsule sessile or nearly so. Along streams: Colo.—Alta. *Submont.*—*Mont.* Je.

***S. cordata* × *monticola*.** This has the capsule shorter than in *S. cordata* but longer than in *S. monticola*, the habit and bark of the latter, but the narrow leaves (although less serrate) and the bractlets of the Rocky Mountain form of the former; the capsule usually remains undeveloped. Northern Utah

34. *S. curtiflora* Anders. A tall shrub; twigs yellowish or rarely purplish; leaves oval-oblong or oblong-lanceolate, acute or short-acuminate at the apex, rounded or rarely subcordate at the base, green and shining above, glaucous beneath, finely serrate, 4-8 cm. long; bracts black, white-pilose; capsule long-rostrate; stipe very short; stamens light yellow. *S. pseudo-cordata* Anders. Wet places: Sask.—Colo.—Alta. *Submont.* My.—Jl.

35. *S. pseudomyrsinites* Anders. A shrub 1 m. high or less; leaf-blades obovate or oblanceolate, 2-6 cm. long, 8-25 mm wide, light green on both sides; aments on short leafy branches, 2-4 cm. long; bracts obovate, fuscous, white-villous; capsule 4-5 mm. long; stipe about 1 mm. long; style about 0.5 long. Mountain bogs: Lab.—Que.—Wyo.—Ore.—Alaska. *Subalp.*—*Mont.* Je.—Jl.

36. *S. myrtillofolia* Anders. A shrub 1-6 dm. high; leaf-blades obovate, oblanceolate or oval, 1-3 cm. long, acute to rounded at the base; aments on short leafy branches, 1-3 cm. long; bractlets fuscous, obovate, glabrous, or villous only at the base; capsule 4-5 mm. long; stipe scarcely 1 mm long; style minute. BLUE-BERRY WILLOW. Wet places: Alaska—Alta.—Mack *Alp.*—*Subalp.* My.—Je.

37. *S. Wolfii* Bebb. A low shrub, less than 1 m. high; leaf-blades oblong or elliptic, acute at both ends, 2-3 cm. long, 7-10 mm. wide, entire-margined; aments subsessile, but usually subtended by a few small leaves, 1-2 cm. long, almost 1 cm. thick; bractlets very dark, sparingly villous; capsule 4-5 mm. long, subsessile; style fully 1 mm. long. Mountain valleys: Colo.—Wyo.—Ida. *Mont.*—*Alp.* My.—Jl.

38. *S. irrorata* Anders. A shrub 2-3 m. high; leaf-blades linear-lanceolate, 6-10 cm. long, glabrous, bright green and shining above, pale and glaucous beneath, remotely serrate or entire; aments subsessile, usually naked, appearing

before the leaves, 2-4 cm. long; bractlets dark, obtuse, white-villous; capsule subsessile; style about 0.5 mm. long. Cañons and river banks: w Tex.—Colo.—Ariz. *Submont.*—*Mont.* Ap—My.

39. *S. Dodgeana* Rydb. A delicate suffruticose plant, scarcely more than 3 cm. high; leaf-blades 4-5 mm. long, oblong or oval, glabrous, obtuse or acute, strongly veined, light green; staminate aments 3-4-flowered; pistillate aments usually 2-flowered; bracts oblong, truncate, sparingly villous; capsule subsessile, 3 mm. long; style obsolete. The smallest willow in the world. Summits: *Mont.*—Wyo. *Alp.* Jl—Au.

40. *S. petiolaris* J. E. Smith. A shrub 1-3 m. high; leaf-blades acuminate at both ends, slightly silky when young, in age dark green and shining above, glaucous beneath; aments appearing before the leaves, naked or nearly so, about 2 cm. long; bractlets yellow with dark tips, white-pilose; capsule 4-6 mm. long, subconic; stipe 2-3 mm. long; style obsolete. Swamps: N.B.—Tenn.—Ills.—S.D.—Sask. *Boreal.* My.

41. *S. Geyeriana* Anders. A shrub 2-3 m. high; leaf-blades linear-ob lanceolate, 2-6 dm. long, densely silky-strigose when young, less so or sometimes glabrate in age, somewhat paler beneath; aments on very short leafy branches, 1-2 cm. long; bractlets oblong, yellowish, sparingly short-villous; capsule subconic, short-pubescent, 5-6 mm. long; stipe 1-2 mm. long; style obsolete. *S. macrocarpa* Nutt. Creek banks and mountain valleys: B.C.—*Mont.*—Colo.—*Mac.* *Submont.*—*Mont.* Ap—Je.

42. *S. gracilis* Anders. A shrub 1-2 m. high; leaf-blades 3-5 cm. long, about 4 mm. wide, linear or lance-linear, at first tomentulose, soon glabrous and green above, slightly glaucous beneath, entire or denticulate; aments on short leafy branches, lax, 2-3 cm. long; bractlets oblong, yellowish with dark apex; capsule elongate-conic, 5-6 cm. long, grayish silky; stipe 3-4 mm. long; style obsolete. *S. rosmarinifolia* Hook. River banks: Sask.—(? Wis.) *Boreal.*

43. *S. discolor* Muhl. A shrub or low tree up to 7 m. high; leaf-blades oblong-ob lanceolate, acute at both ends, irregularly serrate or entire, bright green above, glaucous beneath, glabrate, 4-10 cm. long, 1.5-3 cm. wide; aments appearing before the leaves, dense, 3-5 cm. long, or the pistillate ones 4-7 cm. in fruit; capsule elongated-conic, about 1 cm. long, long-silky; stipe about 2 mm. long; stigma obsolete. Pussy Willow. Swamps and wet places: N.S.—Del.—Mo.—S.D.—Sask. *Boreal.* Mr—Ap.

44. *S. perstrata* Rydb. A shrub 1-4 m. high; leaf-blades obovate-lanceolate or ob lanceolate, when young finely silky, in age glabrate, 2-4 cm. long, 1-1.5 cm. wide, undulate or entire, light green above, pale beneath; aments usually on very short leafy branches, 1-3 cm. long; bractlets sparingly silky; capsule elongated-conic, 7-8 mm. long, finely pubescent; stipe 2-3 mm. long; style obsolete. BEAKED WILLOW. River valleys: Hudson Bay—Neb.—Colo.—Utah—Alaska. *Submont.*—*Mont.* My—Je.

45. *S. Bebbiana* Sarg. A shrub 2-6 m. high, sometimes a tree 8 m. high; leaf-blades elliptic, oblong, or oblong-lanceolate, acute, blunt, or short-acuminate, rounded at the base, sparingly serrate or entire; aments sessile, sometimes subtended by a few small leaves, 2-5 cm. long; bractlets sparingly long-villous; capsule elongated-conic, finely pubescent, about 8 mm. long; stipe 2-3 mm. long; style obsolete. *S. rostrata* Richards. Valleys, river banks, and hillsides: Anticosti—N.J.—N.M.—Ariz.—Calif.—B.C. *Plain*—*Mont.* Ap—My.

46. *S. Scouleriana* Barratt. A shrub or tree, occasionally 9 m. high; young twigs from densely velutinous to almost glabrous; leaf-blades obovate, rounded or abruptly acute at the apex, cuneate at the base, at maturity thin, dark yellowish green and lustrous above, pale, glaucous and more or less pubescent beneath, 4-10 cm. long; aments sessile, naked, 2-4 cm. long, about 1 cm. thick; capsule subconic, about 1 cm. long, densely white-villous; stipe short; style very short. *S. flavescens* Nutt. *S. Nuttallii* Sarg. Along streams: Sask.—N.M.—Calif.—Yukon. *Submont.*—*Mont.* Mr—Je.

47. *S. Lemmonii* Bebb. A shrub 1-5 m. high; branches at first pubescent, soon glabrate; leaves lanceolate, acute at both ends, entire or subserrulate, silky when young, soon glabrous, sometimes slightly glaucous beneath; aments on short leafy peduncles, 2-3 cm. long; bractlets obovate; capsules grayish tomentose, 4-6 mm. long; stipe 2-3 times as long as the glands. Wet places: Calif.—Nev.—Ida. *Submont.*—*Mont.* Je-Jl.

48. *S. alaxensis* (Anders.) Coville. A tree sometimes 9 m. high, or a shrub 1-2 m. high; leaf-blades obovate to oblong-oblancoate, acute or rounded at the apex, acute at the base, densely white-tomentose beneath, 5-10 cm. long, 2-4 cm. wide; aments 3-6 cm. long, sessile, naked, appearing with the leaves; capsule white-villous, about 6 mm. long, subsessile; style about 2 mm. long. *S. speciosa* H. & A. Subarctic and arctic regions: Alaska—Mack.—Canadian Rockies. *Subalp.* My-Je.

49. *S. Barrattiana* Hook. A low shrub; leaf-blades obovate, acute at the apex, often subcordate at the base, 5-7 cm. long, densely white-silky, in age greener above; aments appearing with the leaves, sessile and naked, 3-5 cm. long; capsule white-silky, about 6 mm. long, white-villous; stipe very short; style fully 1 mm. long. *S. albertana* Rowley. Alpine swamps: Alta.—B C *Subalp.* Je-Jl.

50. *S. bella* Piper. A shrub 2-4 m. high; leaf-blades mostly acute, 3-10 cm. long, 1-2.5 cm. wide, green and sparsely puberulent above, entire or repand, aments sessile, usually naked, appearing before the leaves, the pistillate ones 2-3 cm. long or in fruit 4-6 cm. long; capsule grayish sericeous, 5-6 mm. long, subsessile; style 1-1.5 mm. long. River banks: Wash.—Mont.—Ida. *Submont.* Ap.

51. *S. candida* Fluegge. A shrub 6-15 dm. high; leaf-blades oblong or oblong-lanceolate, thick, sparingly repand-denticulate or entire, acute at both ends, dark green above, 5-10 cm. long, 6-16 mm. wide; aments sessile and usually naked, appearing before the leaves, 2-5 cm. long; capsule subconic, densely white-tomentose, 6-7 mm. long; stipe less than 1 mm. long; style about 1 mm. long. HOARY WILLOW. Bogs: Lab.—N.J.—Colo.—Ida—Alta. *Mont.* My.

***S. cordata* × *candida*.** Resembling *S. candida* in leaf-form, but less densely hairy and thinner; aments more like those of *S. cordata*, borne on short branches; capsules glabrous or nearly so. Collected at Ravalli, Mont

52. *S. sitchensis* Sanson. A tree or shrub 2-9 m. high; leaf-blades 3-6 cm. long, entire or remotely glandular-denticulate, acute or abruptly acuminate, at first tomentose, in age dark green, shining and glabrous above, densely white-silky beneath; aments densely flowered, naked or on short leafy branches, the staminate ones 3-5 cm. long, the pistillate ones 4-7 cm. long, capsule grayish, short-silky, about 5 mm. long; stipe and style about 0.5 mm. each. SITKA WILLOW. River banks: Alaska—Calif.—Mont. *Submont.*—*Mont.* Ap-Je

53. *S. Drummondiana* Barratt. A shrub; leaf-blades broadly obovate, 5-7 cm. long, 2-3 cm. wide, glabrous above, white-tomentose beneath, entire-margined; aments 2-4 cm. long, subsessile, but usually subtended by a few small leaves; capsule 3-4 mm. long, white-silky, with short hairs, subsessile; style about 0.5 mm. long. Marshes: Canadian Rockies. *Subalp.*

54. *S. argyrocarpa* Anders. An erect shrub 1-6 dm. high; leaf-blades oblong or oblanceolate, acute at both ends, entire or crenulate, bright green and glabrous above, silvery-silky beneath, 3-5 cm. long, 6-12 mm. wide; aments on short leafy branches, dense, 1-2.5 cm. long; bractlets villous; capsule 2-3 mm. long, white-villous; stipe 1-2 mm. long. SILVER WILLOW. Mountains and hills: Lab.—N.H.—w Ont.—(? Sask.)—Mack. *Boreal.* Je-Jl.

55. *S. arbusculoides* Anders. An erect shrub less than 1 m. high; leaf-blades elliptic-lanceolate, acute at both ends, glabrous and green above, silky beneath, minutely serrulate or entire, 2-5 cm. long; aments appearing with the leaves, 2-3 cm. long, usually sessile, naked or subtended by a few leaves; capsule 3-4 mm. long, subsessile. Swamps: Hudson Bay—Canadian Rockies—Alaska. *Subalp.*

56. *S. pellita* Anders. A low shrub; leaf-blades oblanceolate, 3-7 cm. long, with entire, somewhat revolute margins, acute or obtuse at the apex, tapering at the base, glabrous or slightly pubescent above when young; aments sessile and naked, 2-3 cm. long; bractlets obovate, brown, with black tip, or wholly blackish, silky; capsule 3-4 mm. long, villous, subsessile; style nearly 1 mm. long. River banks. Me.—Que.—Sask.—Alta. *Boreal*. Je.

57. *S. subcoerulea* Piper. Shrub about 2 m. high; leaf-blades oblanceolate, entire or nearly so, green and minutely pubescent above, 2-5 cm. long, 1 cm. wide or less; aments 2.5-4 cm. long, less than 1 cm. thick; capsule white-silky, 2-3 mm. long, subsessile; style about 1 mm. long. BLUE WILLOW. River banks. B.C.—Mont.—Wyo.—Calif. My-Jl.

58. *S. pachnophora* Rydb. A shrub 2-3 m. high or perhaps sometimes higher; leaf-blades oblong-lanceolate or oblanceolate, 3-5 cm. long, acute at both ends, densely white-silky beneath, glabrate above, rather thin; aments 1-3 cm. long; capsule grayish silky, ovoid, 3-5 mm. long; style slender, about 1.5 mm. long. River banks: Colo.—N.M.—Utah. *Submont.*—*Mont.* My-Je.

59. *S. brachycarpa* Nutt. A shrub 1 m. high or less; bark yellow; twigs densely villous; leaf-blades oblong to oval or oblanceolate, 1-3 cm. long, entire-margined, aments 1-2 cm. long; bracts yellow, obovate, villous; capsule 4-5 mm. long, villous, subsessile; style less than 0.5 mm. long. *S. stricta* (Anders.) Rydb. Wet places in the mountains: B.C.—Colo.—Alta; Que. *Submont.*—*Subalp.* Jl-Au

60. *S. idahoensis* (Ball) Rydb. Shrub 1-2 m. high; branches yellowish or light brown, silky when young; leaf-blades oblanceolate, 3-5 cm. long, entire; aments 1-2 cm. long; bractlets obovate, brownish; capsules ovoid, subsessile, finely and sparingly pubescent; style about 1 mm. long. *S. Wolfii idahoensis* Ball. Banks and marshes: Orc.—Wyo.—Wash. *Submont.*—*Mont.* Je-Jl.

61. *S. pseudolapponum* v. Seem. A shrub 1 m. high or less; twigs brown, at first grayish pubescent; leaf-blades oblong or lance-oblong, acute at both ends, entire-margined, green above, gray below; aments appearing with the leaves, 1-2 cm. long; bractlets brown below, with black tips; capsule grayish, villous, subsessile, about 5 mm. long; style about 0.5 mm. long. Summits: Colo. *Subalp.*—*Alp.* Je-Jl.

62. *S. glaucops* Anders. A shrub 1-2 m. high; twigs usually more or less villous; leaf-blades green above, paler beneath, entire-margined, 3-6 cm. long; aments 2-3 cm. long, bractlets fuscous, oblong, often acutish, short-villous; capsule grayish villous, about 5 mm. long, subsessile; style about 0.5 mm. long. Mountains: Alta.—N.M.—Utah—Calif.—Yukon. *Submont.*—*Subalp.* Je-Jl.

S. glaucops × *monticola*. It resembles *S. glaucops* in the capsules and bractlets, but the former are less densely hairy; the leaves and bark are more like those of *S. monticola*, the former being finely serrate, glabrate in age, and glaucous beneath; the young branches are somewhat villous. Big Cottonwood Cañon, Utah.

63. *S. Seemannii* Rydb. A shrub 3-4 m. high; young twigs villous-pubescent, leaf-blades oval to oblong-lanceolate, 3-7 cm. long, rather firm, entire-margined, sometimes glabrate above in age; aments 2-7 cm. long; bracts obtuse, villous; capsule about 8 mm. long, densely white-villous, subsessile; style 0.5-1 mm. long. Mountains: Alaska—Yukon—Mont. *Subalp.* Je-Jl.

64. *S. subcordata* Anders. A low shrub, with erect stems; leaf-blades obovate, oval, or rounded, sometimes subcordate at the base, 2-5 cm. long, 1-4 cm. wide, paler and strongly reticulated beneath; aments 2-3 cm. long; bractlets yellow, usually with darker tips; capsule white-villous, subsessile; style nearly 1 mm. long. Mountains: Alta.—B.C. *Mont.* Jl-Au.

65. *S. desertorum* Richards. A shrub 1-2 m. high; leaf-blades 1-3 cm. long, entire-margined, dark green above, glaucous beneath; aments 1-3 cm. long; bracts obovate, brown or yellow, sparingly pubescent; capsule densely white-villous, 3-4 mm. long, subsessile; style about 0.5 mm. long. BARREN-GROUND WILLOW. Wet places: Sask.—Alta.—Mack.; (Gaspé Peninsula) Que. *Boreal*—*Subarctic*. Jl-Au.

66. *S. Austinae* Bebb. A shrub 1-3 m. high; leaf-blades usually short-acuminate, 3-6 cm. long, glabrous or slightly pubescent but green above, glaucous beneath; aments 2-5 cm. long; bractlets oblong, brown, sparingly white-silky; capsule elongate, subconic, 6-8 mm. long; stipe very short; style nearly 1 mm. long. *S. glaucops glabrescens* Anders. Wet places on the mountains: Alta.—Wyo.—B.C.—Yukon. *Submont.*—*Mont.* Je—Jl.

***S. Austinae* × *pseudolapponum*.** This has the glabrous leaves and yellowish or light-brown bractlets of *S. Austinae*, but the low habit, smaller leaves and short capsule of *S. pseudolapponum*. *S. wyomingensis* Rydb. Mountains Wyo. Jl.

67. *S. MacCalliana* Rowley. A shrub 1-2 m. high; leaf-blades 6-7 cm. long, 1.5 cm. wide, acute at both ends, puberulent when young, soon glabrous, green on both sides, finely serrulate; aments 3-4 cm. long; bractlets greenish or brown; capsule elongated-conic, white-velvety, 8-10 mm. long; stipe 1 mm. long; style less than 1 mm. long. Low ground: Alta. *Mont.*

68. *S. saskatchewanae* v. Seem. A tall shrub or small tree; leaf-blades acute at both ends, 3-6 cm. long, 1 cm. broad or less, finely serrate, soon glabrate, dark green above, glaucous beneath; aments 2-5 cm. long; bractlets brown, oval, sparingly villous; capsule grayish silky, with short hairs, about 5 mm. long, nearly sessile; style scarcely 0.25 mm. long. River banks and marshes: Sask.—Alta.—Yukon. *Boreal.* Je.

69. *S. petrophila* Rydb. A depressed creeping undershrub, less than 1 dm. high; leaf-blades 1-3 cm. long, obtuse, glabrous or sparingly silky at first, entire-margined, slightly paler and strongly veined beneath; aments 2-3 cm. long; bractlets blackish, obovate, sparingly silky-villous; capsule white-villous, sessile, 5-7 mm. long; style fully 0.5 mm. long. *S. arctica petraea* Anders. Rock Willow. Alpine peaks: B.C.—Calif.—N.M.—Mack. *Alp.*—*Subalp.* Jl—Au

70. *S. cascadiensis* Cockerell. A depressed creeping undershrub, less than 1 dm. high; leaf-blades 1-2 cm. long, 2-5 mm. wide, light green on both sides, strongly veined beneath; aments about 1 cm. long; bractlets black, obovate, capsule grayish villous, about 4 mm. long, sessile; style about 0.5 mm. long. *S. tenera* Anders. Alpine peaks: B.C.—Wash.—Utah—Wyo.—*Mont.* *Alp.*—*Mont.* Jl—Au.

71. *S. Nelsonii* Ball. A shrub 1-3 m. high; leaf-blades acute at both ends, 8-15 mm. wide, 3-6 cm. long, entire or sparingly crenate, dark green and shining above, glaucous beneath; aments 1.5-3 cm. long; bractlets black or nearly so, ovate, acute, long-silky; capsule silky-pubescent, sessile, 5-7 mm. long; style nearly 0.5 mm. long. Bogs and river banks: Colo.—Utah.—Alta. *Mont.*—*Subalp.* Je.

72. *S. chorophylla* Anders. A shrub 1-3 m. high; leaf-blades at first silky, soon glabrate, dark green and shining above, glaucous beneath, acute at both ends, usually entire, 2-5 cm. long; aments 2-6 cm. long; bractlets black, obovate, obtuse, silky-pilose; capsule sessile, 5-6 mm. long, grayish silky; style about 0.5 mm. long. Mountain swamps: Lab.—N.H.—N.M.—Utah—Alaska. *Mont.*—*Subalp.* Je—Au.

73. *S. Fernaldii* Blankinship. A low spreading shrub, up to 1 m. high; leaf-blades oval, rarely ovate, rounded at both ends or sometimes acutish at the apex, 3-5 cm. long, glabrous and green above, silvery-silky and strongly veined beneath; margins sub-entire; aments at the ends of the leafy branches, 2-3 cm. long; bractlets brown, short-villous, obovate; capsule short-ovoid, 2-3 mm. long; sessile. Perhaps not distinct from the eastern *S. vestita* Pursh. Mountains: Alta.—*Mont.*—Ore.—B.C. *Mont.*—*Subalp.* Je—Au.

74. *S. orbicularis* Anders. Low creeping undershrub; leaf-blades oval or orbicular, 1.5-4 cm. long, 1-4 cm. wide, rounded at both ends or sometimes subcordate at the base, glabrous, dark green above, pale and somewhat glaucous beneath; aments at the ends of the leafy branches, 2-4 cm. long; capsule short-ovoid, 3-5 mm. long, short-villous, sessile. (Perhaps not distinct from *S. reticulata* L., which has narrower yellow bractlets and usually narrower leaves.) NET-VEINED WILLOW. Arctic-alpine situations: Alaska—Canadian Rockies—Hudson Bay. *Alp.* Je—Au.

75. *S. saximontana* Rydb. A densely caespitose, creeping undershrub, rarely over 5 cm. high; leaf-blades light green above, glaucous beneath, glabrous, 1-2 cm. long, oblong or elliptic, commonly acutish at both ends; aments at the ends of the leafy branches, 1-2 cm. long, loosely flowered; capsule ovoid, densely grayish pubescent with short hairs, sessile, 3 mm. long; style obsolete. *S. reticulata* Porter & Coulter, not L. *S. aemulans* v. Seem. ROCKY MOUNTAIN WILLOW. High mountain tops: N.M.—Nev.—Wash.—Alta. Alp.—Mont. Jl—Au.

76. *S. nivalis* Hook. A caespitose, creeping undershrub, 1-5 cm. high; leaf-blades oval or orbicular, 1 cm. long or less, glabrous, entire, dark green above, glaucous beneath; aments at the ends of the leafy branches, 1 cm. long or less, few-flowered; capsule grayish, pubescent with short hairs, about 3 mm. long, sessile. SNOW WILLOW. High mountains: B.C.—Wash.—Mont.—Alta. Alp. Jl—Au.

FAMILY 31. FAGACEAE. BEECH FAMILY.

Monococious trees or shrubs, with simple leaves. Staminate flowers in elongate or head-like aments; calyx of 4-7 partially united sepals; stamens 4-20. Pistillate flowers in longer or shorter spikes; calyx of partly united sepals. Gynoeceum of 3-7 united carpels; styles as many, but usually only one ovule maturing. Fruit a one-seeded nut, enclosed or seated in a scaly or spiny, in ours cup-like involucre.

1. QUERCUS (Tourn.) L. OAK.

Trees or shrubs, with hard coarsely grained wood. Leaf-blades entire, toothed, or lobed, firm-membranous or leathery, sometimes evergreen. Staminate aments elongate, drooping, clustered; calyx campanulate, 4-7-lobed; stamens 6-12; filaments filiform. Pistillate flowers solitary or in lax spikes; calyx urn-shaped or cup-shaped. Ovary usually 3-celled; styles 3; ovules 2 in each cell, but seldom more than one maturing in each pistil. Fruit a leathery, 1-seeded nut (*acorn*), partly enclosed in an accrescent scaly involucre (*cup*).

Leaves lobed or divided, not evergreen; lobes rounded, obtuse or acute, but not spinulose-tipped.

Leaves bright green, early deciduous.

Upper scales of the cup with caudate prolongations.

1. *Q. macrocarpa*.

Upper scales of the cup not prolonged.

Mature leaves softly pubescent, almost velvety beneath, deeply divided.

Scales of the cup thin, not much thickened on the back.

2. *Q. submollis*.

Scales of the cup corky-thickened on the back.

3. *Q. utahensis*.

Mature leaves glabrate, puberulent, or somewhat pubescent, but not velvety beneath.

Cup flat, covering less than one-fourth of the acorn

4. *Q. Vreelandii*.

Cup hemispheric, covering one-third to one-half of the acorn

Mature leaves very thin, glabrate beneath or puberulent only on the veins, cup covering about one-half of the acorn.

5. *Q. lepiophylla*.

Mature leaves firm, puberulent beneath; cup covering about one-third of the acorn

Leaves mostly oblong in outline, lobed half way to the midrib or less, rather dull.

6. *Q. Gunnisonii*.

Leaves obovate in outline, divided deeper than half way to the midrib, very shining above

Lobes of the leaves broadly oblong, rounded at the apex.

7. *Q. Gambelii*.

Lobes of the leaves ovate or triangular, acute.

8. *Q. noronensis*.

Leaves pale or bluish green, more persistent

Leaves broadly obovate, with narrow sinuses.

9. *Q. Eastwoodiae*.

Leaves oblong-obovate, or elliptic; sinuses broad

Lobes oblong-ovate, obtuse or acutish, not mucronate

10. *Q. venustula*.

Lobes triangular-ovate, mucronate.

11. *Q. Fendleri*.

Leaves persistent, usually evergreen, entire, sinuate or dentate, or if more deeply lobed, the lobes with spinulose tips.

Cup hemispheric, acorns barrel-shaped.

Scales of the cups decidedly corky-thickened on the back.

Leaves decidedly crisp, sinuately lobed; lobes distinctly spinulose-tipped

12. *Q. pungens*

Leaves flat, sinuate-dentate or entire; teeth mucronate, or sometimes slightly spinulose-tipped

Acorns 6-7 mm. thick; cup shallow, enclosing about one-third of the acorn, leaves usually sinuate-dentate.

13. *Q. undulata*

Acorns about 1 cm. thick or more; cup deeper, enclosing about half of the acorn.

Leaves usually entire, except those of the young shoots.

14. *Q. grisea*.

Leaves lobed, with few (5-7) lobes.

15. *Q. paniculata*

Scales of the cups thin, only slightly thickened on the back; leaves glabrate and shining above in age.

16. *Q. Wilcoxii*.

Cup more or less turbinate, acorns elongated-ovoid.

17. *Q. turbinella*.

1. *Q. macrocarpa* Michx. A tree 10-50 m. high; leaf-blades obovate, irregularly round-lobed, usually pinnately divided below the middle, bright green and shining above, grayish tomentulose beneath, 1-2 dm. long; fruit short-peduncled; cup hemispheric, 1-2.5 cm. in diameter; scales floccose, thick, ovate or lanceolate, the upper subulate-tipped; acorns 1.5-2.5 cm. long, ovoid. **BUX OAK. MOSSY-CUP OAK.** Rich soil: N.S.—Pa.—Tex.—(? Wyo.)—S.D.—Sask. *Plain—Submont. My—Je.*

2. *Q. submollis* Rydb. Shrub or small tree; leaf-blades obovate in outline, deeply pinnatifid at least two-thirds to the midrib, with oblong segments, rounded at the apex, glabrous and shining above, densely and softly pubescent beneath; fruit sessile; cup depressed-hemispheric, about 15 mm. broad; acorn obtuse, 12-15 mm. long. Mountain sides: Ariz.—s Utah—N.M. *Son.—Submont.*

3. *Q. utahensis* (A. DC.) Rydb. A small tree, sometimes 10 m. high, or more often only a shrub; leaf-blades 6-10 cm. long, broadly obovate, deeply divided, often to near the midrib; lobes oblong, rounded at the apex, the larger usually again lobed or undulate; upper surface sparingly stellate, in age glabrate, dark green and glossy; fruit subsessile; cup hemispheric, 12-15 mm. in diameter; scales pubescent, ovate; acorn 15-20 mm. long, light brown. **UTAH OAK.** Hills and mountains: Utah—Colo.—N.M.—Ariz. *Submont.—Mont. My.*

4. *Q. Vreelandii* Rydb. A small shrub 1-1.5 m. high; young branches brown, puberulent; leaf-blades 5-7 cm. long, obovate, deeply lobed about two-thirds to the midrib, thick, firm; lobes rounded, the larger often lobed or sinuate; upper surface soon glabrate, bright green and rather dull; lower surface slightly paler; fruit subsessile; scales ovate and very corky on the back; acorn about 15 mm. long, light brown. Hills and bench-lands: Colo.—N.M. *Submont. My*

5. *Q. leptophylla* Rydb. A tree 10-15 m. high; young twigs brownish or purplish, slightly pubescent at first; leaf-blades broadly obovate, very thin, pinnately 5-9-lobed scarcely more than half way to the midrib, lobes rounded, upper surface soon glabrate, bright green, but not very glossy; lower surface paler; fruit subsessile; cup hemispheric, about 15 mm. wide; scales ovate-lanceolate, obtuse, only slightly thickened on the back. Along mountain streams. Colo.—N.M. *Submont.—Mont. My.*

6. *Q. Gunnisonii* (Torr.) Rydb. A low shrub 1-3 m. high, forming chapparels; leaf-blades with rounded lobes, usually directed forward, very thick, pale and bluish green above, soon glabrate, scarcely paler beneath; fruit subsessile; cup rather deep, 12-15 mm. in diameter, hemispheric; scales ovate, corky-thickened on the back; acorns barrel-shaped, obtuse. Dry hillsides and table-lands: Colo.—N.M.—Ariz.—Utah. *Submont. My.*

7. *Q. Gambellii* Nutt. A shrub 3-5 m. high; young twigs light brown and puberulent; leaf-blades broadly obovate in outline, thinner than in the preceding; upper surface glabrate, green, lower surface only slightly paler, lobes rounded; fruit subsessile; cup hemispheric or somewhat turbinate; acorn ovoid, acute or obtuse, about 15 mm. long. *Q. nitescens* Rydb. Hills and table-lands: Wyo.—N.M.—Utah. *Submont.—Mont. My—Je.*

8. *Q. novomexicana* (A. DC.) Rydb. A shrub 3-5 m. high; young branches light brown, or grayish, sparingly puberulent or glabrous; leaf-blades obovate in outline, deeply divided about three-fourths the distance to the midrib, very

firm; upper surface soon glabrous, dark green and glossy; lower surface pale green, puberulent; fruit subsessile; cup hemispheric, 10–12 mm. in diameter; scales ovate, moderately corky-thickened. Table-lands and hills: N.M.—Colo.—Utah. *Submont.*—*Mont.* My.

9. *Q. Eastwoodiae* Rydb. A shrub 2–3 m. high, not forming thickets; young branchlets densely stellate-pubescent, almost velvety; leaf-blades rounded at the apex, obtuse or acutish at the base, 6–8 cm. long, 3–6 cm. broad, pale bluish green, on the upper surface slightly stellate, especially on the veins, or glabrate, on the lower paler, strongly reticulate and decidedly stellate, with broad rounded lobes, fruit subsessile; cup hemispheric, 12–14 mm. in diameter; scales ovate, acutish, moderately corky-thickened on the back; acorn round-ellipsoid, mostly half included in the cup. Cañons: Utah. *Son.*

10. *Q. venustula* Greene. A small shrub 1–2 m. high; young twigs brown, puberulent or glabrate; leaf-blades 3–6 cm. long, oblanceolate or elliptic in outline, lobed more than half way to the midrib, firm; upper surface pale bluish green, sparingly stellate, glabrate and glossy; lower surface paler, densely stellate-puberulent, very veiny and reticulate; fruits in peduncled spikes; scales of the cup ovate, corky-thickened on the back. Mountains: Colo.—N.M. *Submont.*—*Son.*

11. *Q. Fendleri* Liebm. A shrub 1–3 m. high, scarcely forming thickets; young branches brown, puberulent; leaf-blades lobed about half way to the midrib, firm, 3–7 cm. long; upper surface sparingly stellate or glabrate, pale bluish green and shining; lower surface light brownish, stellate-puberulent, strongly veined and reticulate; fruits 2–3 together on a peduncle; cup hemispheric, covering about one-third of the acorn, 10–12 mm. broad; scales ovate and much corky-thickened, acorns 15–18 mm. long. Barren hills: Ariz.—Colo.—Tex. *Son.*—*Submont.* My.

12. *Q. pungens* Liebm. A low shrub 1–3 m. high, rarely larger; younger twigs yellowish or brownish, densely stellate-pubescent; leaf-blades oval or broadly oblong, obtuse at the base, acute at the apex, deeply sinuately toothed, 3–5 cm. long, thick and firm; upper surface pale bluish or brownish green, rather dull, sparingly stellate; lower surface more or less densely stellate, pale yellowish or brownish, lobes triangular; cup hemispheric, 8–10 mm. in diameter; acorns 10–13 mm. long. HOLLY OAK. Hills: N.M.—Colo.—Utah—Ariz.; n Mex. *Son.* Mr.—My.

13. *Q. undulata* Torr. A shrub 1–3 m. high; young twigs sparingly stellate-pubescent; leaf-blades firm, pale bluish or brownish green and shining above, pale brownish beneath, stellate when young, almost glabrous in age on both sides, or sometimes densely stellate-pubescent beneath; cup hemispheric, 7–10 mm. broad; acorn 10–15 mm. long, 6–7 mm. in diameter. LIVE OAK. Barren hills: Ariz.—Colo.—Tex. *Son.*—*Submont.* My.

14. *Q. grisea* Liebm. A shrub usually a few meters high, rarely a small tree; younger twigs yellowish and stellate-pubescent; leaves from oval to oblong or sometimes oblong-lanceolate, acute at the apex, cordate or rounded at the base, usually entire or undulate, sometimes on young shoots dentate, 2–5 cm. long, upper surface pale bluish green, shining; lower surface densely stellate and fulvous; acorns about 15 mm. long. Table-lands: Tex.—s Utah—Ariz. *Son.* Ap—My.

15. *Q. pauciloba* Rydb. Tree 4–5 m. high, rarely a shrub; young branches brown, pubescent; leaf-blades broadly oval, ovate, or obovate, 5–8 cm. long, 3–5 mm. wide, sinuately 5–7-lobed, pale bluish green above, pale brownish, strongly reticulate, and stellate-pubescent beneath; lobes broadly triangular, spinulose-tipped; cup hemispheric, 12–18 mm. in diameter; acorn sometimes 15 mm. long. Cañons: Ariz.—s Utah. *Son.*

16. *Q. Wilcoxii* Rydb. A shrub or rarely a small tree 6–9 m. high; young branchlets fulvous-tomentulose; leaf-blades usually broadly oval, acute at the base, abruptly short-acuminate, thick and firm, 1–4 cm. long, when young deciduously fulvous stellate-tomentulose especially on the lower surface, dull

white and punctate beneath, with many lateral veins and obsolete reticulations, usually entire or with a few spinulose-tipped teeth; those of the sterile shoots almost orbicular or round-ovate in outline, coarsely and deeply dentate with spinose-tipped teeth; cup hemispheric, 10-14 mm in diameter; scales ovate, with brown acute tips; acorn ovoid, about 15 mm. long. Mountains: N.M.—Utah—Ariz.—Nev. *Son.*

17. *Q. turbinella* Greene. A shrub 1-3 m. high; young branchlets covered with a white stellate-pubescent and when young with fulvous tomentum; leaf-blades oblong, elliptic, oval or rarely ovate, 1-3 cm. long, acute at the apex, usually sinuate-dentate with spinulose-tipped teeth, when unfolding covered with a fulvous tomentum, light bluish green and shining above, strongly reticulate, fulvous, stellate-pubescent beneath; cup 8-10 mm. in diameter; scales deltoid-ovate, obtuse, moderately corky-thickened; acorn 15-20 mm. long, 8 mm. in diameter. Dry hills: Calif.—Utah—Ariz ; Sonora and L. Calif. *Son.* Ap-My.

FAMILY 32. **BETULACEAE.** BIRCH FAMILY.

Monoecious trees or shrubs, with simple alternate leaves. Staminate flowers in long drooping aments, each bract subtending 2 or 3 flowers; calyx present. Pistillate flowers also in aments, but the aments seldom drooping, without calyx; pistils 2 or 3 at the base of each bract. Fruiting aments cone-like; fruit small nuts or samaras; seed solitary.

Bracts of the mature pistillate aments membranous, in ours 3-lobed, deciduous with the fruit.

Bracts of the mature pistillate aments thickened and woody, persistent.

1. *BETULA*
2. *ALNUS*

1. **BÉTULA** (Tourn.) L. BIRCH.

Shrubs or trees, with resinous aromatic bark; branchlets with transverse lenticels. Staminate aments slender, pendulous; calyx irregularly 2- or 4-lobed, stamens 2, inserted at the base of the calyx; filaments very short, branched at the apex; anther-sacs separate. Pistillate aments erect or drooping, oblong or cylindric; bracts elongate, in ours 3-lobed, 3-flowered, acerescent, deciduous. Fruit small, samara-like or nut-like, flat; outer seed-coat thin, produced into a wing or margin; seeds solitary, pendulous.

Bark separating into layers or sheets, the very thin outer layer peeling into small shreds.

all trees.

Bark chalky white to silvery gray.

Leaves broadly ovate, with acute apex, mostly subcordate base, and spreading teeth; twigs mostly glabrous, middle lobe of the bractlets acute, slightly longer than the rounded lateral ones.

1. *B. subcordata*

Leaves narrowly ovate, with long-acute or acuminate apex, rounded or cuneate base, and teeth directed forward, twigs pubescent, middle lobe of the bractlets narrow, rounded at the apex, about twice as long as the acute or obtuse lateral ones.

2. *B. papyrifera*

Bark yellowish or reddish brown, often very dark, twigs very glandular.

Leaves ovate, very thin, dark green, acute at the apex, irregularly doubly-serrate, with long-pointed, slender teeth.

3. *B. occidentalis*

Leaves deltoid or ovate, thick, bronze-green, long-acuminate at the apex, coarsely and more regularly serrate.

4. *B. alaskana*

Bark not separating into layers; outer bark not peeling into shreds.

Samara-wing broader than the body.

Twigs and branchlets glandular-resiniferous, not hairy.

Lateral lobes of the bractlets spreading, obliquely ovate, auricled at the base.

all trees

Leaves very thin, fruiting aments narrowly cylindric, elongate, less than 1 cm. thick; lateral lobes of the bractlets obtuse or rounded, claw much shorter than the middle lobe.

5. *B. Piperi*

Leaves thick; fruiting aments broadly cylindric, stout, more than 1 cm thick, lateral lobes of the bractlets mostly acute, claw as long as the middle lobe.

6. *B. utahensis*

Lateral lobes of the bractlets ascending, obliquely rhombic, not auricled at the base, shrubs or trees

Shrubs or small shrub-like trees; bark shining, dark red-brown, smooth, leaves broadly ovate, usually less than 4 cm long, coarsely and irregularly serrate, thin, dark green, obtuse or acute at the apex, mostly rounded at the base, twigs densely glandular-resiniferous.

7. *B. fontinalis*

- Trees, often very large, never shrub-like, bark ashy gray or brown, roughened; leaves ovate, sometimes lobed, 4-7 cm. long, finely serrate, dull bronze-green, acute at the apex, truncate at the base; twigs but slightly glandular-resiniferous 8. *B. montanensis*
- Twigs and branchlets more or less pubescent, not or sparingly glandular-resiniferous; shrubs or shrub-like trees.
- Leaves oval or rhombic-ovate
- Leaves narrowly oval or rhombic-ovate, 6 cm. long or more, sharply serrate or dentate, apex acute, base cuneate, twigs finely pubescent, not glandular, middle lobe of the bractlets triangular, obtuse, lateral lobes rounded, obliquely rhombic, fruiting aments 2-4 cm. long. 9 *B. Sandbergii*
- Leaves broadly oval, less than 4 cm. long, acute at both ends, serrate or serrate-crenate, twigs pubescent and sparingly glandular; middle lobe of the bractlets rounded, as broad as or broader than the ascending lateral ones, fruiting aments less than 2 cm. long. 10 *B. Elrodiana*
- Leaves obovate, rounded at the apex, cuneate at the base; twigs puberulent and with scattered coarse hairs, sparingly glandular. 11. *B. obovata*
- Samara-wing narrower than the body; shrubs mostly low.
- Twigs and branchlets pubescent, slightly glandular
- Leaves finely crenate or crenate-serrate, oval, acute at both ends, twigs at first puberulent, at length glabrate 12 *B. crenata*
- Leaves coarsely serrate, obovate, acute or obtuse at the apex, cuneate at the base, twigs with long scattered coarse hairs 13 *B. glandulifera*
- Twigs and branchlets glabrous, densely glandular-resiniferous; leaves obovate or orbicular, crenate-serrate 14 *B. glandulosa*

1. *B. subcordata* Rydb. A small tree; twigs reddish brown; leaf-blades 3-10 cm. long, pubescent when young, in age glabrate and dull bronze-green above, paler and pubescent beneath, irregularly toothed, with broad triangular teeth; pistillate aments short-peduncled on short lateral branches, 2-4 cm. long and 1 cm. thick in fruit; body of the fruit elliptic, the wing of about the same width. WHITE BIRCH. Mountain woods: Alta.—Mont.—Ida.—B.C. *Mont.*—*Submont.* Ap.

2. *B. papyrifera* March. A tree up to 25 m. high; leaf-blades 3-11 cm. long, irregularly or doubly serrate, glabrous and dark green above, pubescent beneath; staminate aments 5-10 cm. long, 2 or 3 at the ends of the branches; pistillate aments peduncled, solitary on small lateral leafy branches, 2-4 cm. long. *B. Andrewsii* A. Nels. PAPER BIRCH. Cold woods: Lab.—N.J.—Colo.—Alaska. *Submont.*—*Subalp.* Ap—My.

3. *B. occidentalis* Hook. A tree sometimes 30-40 m. high; twigs brown, at first pubescent or puberulent; leaf-blades acute at the apex, rounded or sometimes subcordate or acute at the base, more or less glandular-resiniferous, pubescent along the veins and in their axils, staminate aments 7-10 cm. long, usually several together; pistillate aments 1-4, on lateral leafy branches, in fruit 3-4 cm. long; terminal lobe of the bractlets lanceolate, longer than the sub-rhomboid, ascending lateral ones. Banks of streams and lakes: B.C.—w Mont.—Wash. *Submont.* My.

4. *B. alaskana* Sarg. A tree 10-12 m., rarely 25 m. high; twigs red-brown, verrucose with conspicuous resinous glands; leaf-blades from cuneate to cordate at the base, acuminate at the apex, entire at the base, glabrous and glandular-resiniferous; staminate aments clustered, 2-4 cm. long; pistillate aments in fruit 2-3 cm. long, 8-10 mm. thick; terminal lobe of the bractlets lanceolate, slightly longer than the rounded-obovate ascending lateral ones. River banks and woods: Alaska—Sask.—Mack. *Boreal* My—Je.

5. *B. Piperi* Britton. A tree up to 15 m. high; leaf-blades broadly ovate, thin, sharply and irregularly serrate, acute or short-acuminate, rounded or acute at the entire base; staminate aments 6-8 cm. long; pistillate aments cylindric, in fruit 3-5 cm. long; terminal lobe of the bractlets triangular-lanceolate. River banks: Wash—Mont—Ida.—Ore. *Submont.* My—Je.

6. *B. utahensis* Britton. A tree 4-6 m. high; leaf-blades ovate to nearly orbicular, sharply toothed, with broad teeth, glabrate in age, thin, acute, 3-5 cm. long, acute or truncate at the base, dull green; staminate aments about 5 cm. long; pistillate ones in fruit 3-4 cm. long; terminal lobe of the bractlets triangular-lanceolate. Cañons and woods: Utah—Wyo.—Mont. *Submont.*—*Mont.* Ap—Je.

7. *B. fontinalis* Sarg. A tree occasionally 10–12 m. high, often growing in clumps and shrub-like; blades sharply double-serrate, entire towards the base, soon glabrous, 2–5 cm. long; staminate aments 5–7 cm. long, several; pistillate aments 2–3 cm. long; terminal lobe of the bractlets lanceolate, decidedly longer than the lateral ones. *B. occidentalis* Nutt., not Hook. MOUNTAIN BIRCH, WATER BIRCH, SWAMP BIRCH, BLACK BIRCH. River banks: Sask.—Neb.—N.M.—Utah—Calif.—B.C.—Yukon. Plain—Mont. My—Je.

8. *B. montanensis* Butler. A large tree; leaf-blades 4–6.5 cm. long, thick and firm, slightly lobed, finely serrate, glabrous above, conspicuously hairy beneath; fruiting aments 2.5–3.5 cm. long; bractlets 5–7 mm. long; middle lobe triangular-lanceolate, acute. Lake shores: Mont. Submont.

9. *B. Sandbergii* Britton. A shrub or shrub-like tree; leaf-blades up to 6 cm. long, thick, firm, dull bronze-green above, paler and sparsely hairy beneath, rhombic-ovate or oval, acute at both ends; fruiting aments 2–4 cm. long, slender-stalked; middle lobe of the bractlets longer than the ascending rounded lateral ones. BLACK BIRCH. Swampy places: Sask.—Minn.—Mont. Plain.

10. *B. Elrodiana* Butler. A low shrub; twigs slender, red-brown or gray, leaf-blades 1–3 cm. long, 1–2 cm. wide, oval or rhombic, rarely ovate or obovate, often suborbicular, shining, dark green above, dull green and reticulate beneath, fruiting aments 10–15 mm. long, 6–8 mm. thick, cylindric or ellipsoid. Swampy places: w Mont. Submont.

11. *B. obovata* Butler. A coarse shrub; branchlets red-brown, becoming gray; leaf-blades 2–4 cm. long, thick, firm, dark, shining above, paler and dull beneath, serrate or crenate-serrate; fruiting aments cylindrical or oval, 2–2.5 cm. long, 6–8 mm. thick; middle lobe of the bractlets long, ovate or triangular, obtuse, or acutish; lateral lobes obliquely rhombic. River banks: w Mont. Submont.

12. *B. crenata* Rydb. A shrub 2.5–4.5 m. high; branches puberulent and reddish when young; leaf-blades slightly pubescent when young, oval or elliptic, 1–3 cm. long, 8–20 mm. wide, crenate, dark green, shining, reticulate-veined above; pistillate aments 12–18 mm. long, about 6 mm. thick; terminal lobe of bractlets oblong or elliptic, obtuse or rounded at the apex; lateral lobes ascending, obliquely ovate or rhombic, obtuse; nut oval, nearly 2 mm. long; wings of nearly the same width. Lake banks: w Mont. Submont. Je.

13. *B. glandulifera* (E. Regel) Butler. A shrub 1–5 m. high; leaf-blades dentate-crenate, with rounded-ovate or on the vigorous shoots triangular teeth, 1.5–3 cm. long, sparingly hirsute when young, soon glabrous, dark green above, yellowish or reddish green beneath; pistillate aments 1–2 cm. long, 6–7 mm. thick; bractlets glabrous; lobes all oblong and obtuse at the apex, of nearly the same length; wing one-fourth to one-half as wide as the oval nut. *B. pumila glandulifera* E. Regel. Boggy places: Ont.—Wis.—Minn.—Sask. Plain—Submont. My.

14. *B. glandulosa* Michx. A shrub 0.3–2 m. high; twigs brown and densely glandular-resiniferous; leaf-blades 1–2.5 cm. long, rounded at both ends or sometimes acutish at the base, bright green above, paler beneath; staminate aments usually solitary, 1–1.5 cm. long; pistillate aments 1–2.5 cm. long, 4–5 mm. thick; bractlets glabrous; lobes oblong, obtuse, the lateral ones shorter, spreading, ascending and curved upward; wing of the samara very narrow. BOG BIRCH, SCRUB BIRCH. Wet places: Greenl.—Me.—Minn.—Colo.—Ore.—Alaska. Submont.—Subalp. Je—Jl.

2. *ALNUS* (Tourn.) Hill. ALDER.

Shrubs or trees, with astringent smooth bark. Staminate aments drooping, calyx irregularly lobed; stamens as many as the lobes and opposite to them; anthers introrse. Pistillate aments ovoid or oblong, cone-like; bracts subtending 2 flowers, becoming woody, truncate or lobed at the apex, persistent. Fruit minute, nut-like, winged or wingless, with thin outer coat. Seeds solitary.

Nut bordered on each side with a membranous wing-margin, fully as broad as the nut; twigs resinous-granuliferous; stamens 4.

Leaves irregularly serrate, usually very oblique at the base, slightly paler beneath.

1. *A. fruticosa*.

Leaves incised and sharply double-serrate, green on both sides.

2. *A. sinuata*.

Nut merely acute-margined

Leaves distinctly lobed and doubly serrate; stamens 4

Mature leaves pubescent, especially beneath, usually glaucous beneath; bark white-speckled

3. *A. incana*

Mature leaves glabrous, except on the veins beneath and in their axils, green on both sides, bark not speckled

4. *A. tenuifolia*

Leaves not lobed, merely sinuate and glandular-dentate, stamens 1-3, usually 2.

5. *A. rhombifolia*.

1. *A. fruticosa* Rupr. A tree sometimes 12 m. high; young twigs minutely puberulent, becoming brown and shining; leaf-blades broadly ovate, 6-10 cm. long, short-acuminate or obtuse; staminate aments in pairs, 10-12 cm. long; filaments longer than the calyx; pistillate aments elliptic, 12-15 mm. long; nut oval, about 2 mm. long ALASKA ALDER. Along streams: Alaska—Yukon—B.C.—Wash.; e. Siberia Submont. My-Je.

2. *A. sinuata* (E. Regel) Rydb. A shrub 1-4 m. high; young twigs brown or greenish, glabrous or nearly so; leaf-blades ovate, 5-10 cm. long, acute or short-acuminate at the apex, acute, rounded or rarely subcordate at the base, thin, glabrous or nearly so; staminate aments 3-8 cm. long; filaments not exceeding the calyx; pistillate aments rounded-ellipsoid, 12-15 mm. long; nut elliptic. MOUNTAIN ALDER. Mountain streams: B.C.—Ore.—Wyo.—Alta. Mont. My-Jl.

3. *A. incana* (L.) Moench Shrub or small tree, rarely 6 m. high; leaf-blades broadly elliptic to ovate, rounded at the base, sharply and doubly serrate, dark green above, downy and ferruginous or glaucous, prominently veined beneath, 5-13 cm. long; staminate aments 3-8 cm. long, the pistillate in fruit 1-1.5 cm. long; nut orbicular, thick-margined. SPECKLED ALDER. Swamps and along streams. Newf.—Pa.—Neb.—Sask.; Eurasia. Boreal. Ap-My.

4. *A. tenuifolia* Nutt. A tall shrub or small tree, sometimes 8-10 m. high; twigs pubescent when young; leaf-blades ovate or oval, obtuse or acute at the apex, rounded or subcordate at the base, 5-10 cm. long; staminate aments 2.5-4.5 cm. long, filaments equalling the calyx; pistillate aments when ripe 1-2 cm. long, ellipsoid; nut 2.5 mm. long. *A. incana virescens* S. Wats. RIVER ALDER. Along streams: Alaska—Calif.—N.M.—Yukon. Submont.—Mont. Ap-My.

5. *A. rhombifolia* Nutt. A tree sometimes 25 m. high; young twigs green and pubescent; leaf-blades oval or rarely ovate, 5-12 cm. long, hairy on both sides when young, often glabrate in age and dark green above, paler beneath; staminate aments 6-15 cm. long, yellow; pistillate aments ellipsoid, 1.5-2 cm. long, nut oval, about 2.5 mm. long. Along streams: B.C.—Ida.—Calif. Submont. D-Ja.

FAMILY 33. CORYLACEAE. HAZELNUT FAMILY.

Monoecious trees or shrubs, with simple alternate leaves. Staminate aments elongate, drooping, each bract subtending a single flower; calyx wanting; filaments distinct, branched at the apex. Pistillate aments short; bracts foliaceous at maturity, each subtending 2 or 3 flowers; calyx present, sometimes represented by a cup. Fruit 1-3 nuts, enclosed in the bracts. Seeds solitary by suppression.

Pistillate flowers many in a cylindric ament; nuts small, enclosed in a bladdery bract

1. *OSTRYA*.

Pistillate flowers few in a head-like ament; nut large, in a leaf-like involucre.

2. *CORYLUS*.

1. *OSTRYA* (Mich.) Scop. IRONWOOD, HOP-HORNBEAM.

Trees with close-grained, hard wood and scaly bark. Staminate aments clustered, drooping; bracts subtending 3-14 stamens; filaments very short,

branched at the tips; anther-sacs separate, pilose above. Pistillate aments terminal, solitary; bracts subtending two flowers, developing into bladderly sacks. Calyx denticulate. Nut ovoid, flattened, obscurely ribbed.

1. *O. virginiana* (Mill.) K. Koch. A tree 6-18 m. high; twigs light green and pubescent at first; leaf-blades ovate or oblong-lanceolate, acuminate at the apex, sharply serrate, 7-15 cm. long; staminate aments 3-7 cm. long; bractlets triangular-ovate, acuminate; pistillate aments about 8 mm., in fruit 4-6 cm. long, nut 5-8 mm. long, shining. Dry woods: N.S.—Fla.—Tex.—(Black Hills) S.D. Submont. Ap—My.

2. *CORYLUS* (Tourn.) L. HAZELNUT.

Shrubs or trees, with branched stem and smooth bark. Staminate aments pendulous, very long, solitary or in clusters; bracts enclosing 4-8 stamens; filaments short, forked at the apex; anther-sacs separate, pilose at the apex. Pistillate aments inconspicuous, clustered at the tips of the branches; each bract enclosing 2 bractlets and an incompletely 2-celled ovary. Nut large, enclosed in a leafy involucre formed by the more or less united bracts

Twigs glabrous or nearly so, beak of the involucre fully twice as long as the nut, strongly ribbed.

Twigs decidedly hirsute, sometimes somewhat glandular; beak of involucre not more than half longer than the nut, not strongly ribbed

1. *C. rostrata* Ait. A shrub 1-2 m. high, with brown branches, leaf-blades ovate or oval, sharply serrate, glabrous or with scattered hairs above, sparingly pubescent especially on the veins beneath, 5-12 cm. long; involucre bracts bristly hairy, united and prolonged into a tubular beak, lacinate at the summit; nut ovoid, scarcely compressed, striate. BEAKED HAZELNUT. Thickets: N.S.—Ga.—Colo.—N.D. Submont. Ap—My.

2. *C. californica* (A. DC.) Rose. A shrub, or small tree, up to 12 m. high, with brown pubescent branches; leaf-blades broadly ovate to suborbicular, 2.5-7 cm. long, cordate or rounded at the base, double-toothed, rough and pubescent above, soft-pubescent and paler beneath; involucre bracts bristly hairy, united into a tube, cleft at the apex; nut rounded-ovoid, 1.5 cm. in diameter. Woods: Calif.—B.C. Son.—Submont.

FAMILY 34. *ULMACEAE*. ELM FAMILY.

Monoecious, polygamous, or hermaphrodite trees or shrubs, with simple leaves, often 2-ranked and oblique at the base. Flowers in cymes or racemes. Calyx of 3-8 sepals, more or less united at the base, imbricate. Stamens of the same number, opposite the sepals. Pistil of 2 united carpels; ovary 2-celled. Fruit a samara, drupe, or nut. Endosperm scant or wanting.

Fruit a samara; embryo straight.

Fruit a drupe; embryo with conduplicate cotyledons

1. *ULMUS*.

2. *CELTIS*

1. *ULMUS* (Tourn.) L. ELM.

Trees or shrubs, with furrowed, often corky bark. Leaves 2-ranked, oblique, straight-veined, serrate, deciduous. Flowers perfect, in axillary clusters. Calyx membranous, 4-9-lobed, usually 5-lobed, campanulate. Stamens exserted; filaments filiform or slightly flattened; anthers extrorse, emarginate at both ends. Ovary sessile or short-stalked, 1-celled or rarely 2-celled; stigmas often incurved, introrse. Samaras orbicular or oblong, winged all around. Seeds flattened.

1. *U. americana* L. A large tree, sometimes 35 m. high, with glabrous or sparingly pubescent twigs; leaves oval or obovate, abruptly acuminate at the apex, obtuse or acutish at the oblique base, sharply, usually doubly serrate, slightly rough above, pubescent or glabrate beneath, 5-12 cm. long; samara ovate-oval, reticulate-veined, 10-12 mm. long, glabrous except the ciliate margins. AMERICAN OR WHITE ELM. Moist soil: Newf.—Fla.—Tex.—se Mont.—Sask. Plain—Submont. Mr—Ap.

2. CÉLTIS (Tourn.) L. HACKBERRY.

Shrubs or trees, with thin smooth or corky-ridged bark. Leaves oblique, serrate or entire, 2-ranked, membranous or leathery. Flowers polygamo-monoecious or monoecious, axillary, the staminate solitary or clustered; the pistillate usually solitary. Calyx 4- or 5-lobed, deciduous. Stamens 4 or 5; filaments incurved; anthers extrorse. Ovary sessile, 1-celled, with 2 recurved stigmas. Drupe globose or ellipsoid, with scant pulp and bony stone.

Leaf-blades neither coriaceous nor pale beneath, nor strongly rugose.

Leaves smooth above 1 *C. occidentalis*.
Leaves very rough, pustulate-scabrous above 2 *C. crassifolia*

Leaf-blades coriaceous, strongly reticulate and rugose, paler beneath, often yellowish green

Leaf-blades strongly pubescent beneath

Pedicels 15-20 mm long, more than twice as long as the fruit; leaf-blades toothed.

Pedicels 4-10 mm long, usually less than twice as long as the fruit, leaf-blades

subentire 4. *C. reticulata*

Leaf-blades glabrous beneath, or slightly hispidulous on the veins and in their axils 5 *C. Douglasii*.

1. *C. occidentalis* L. A small tree, sometimes 20 m. high; bark of the stem gray, corky-ridged; leaf-blades ovate to ovate-lanceolate, pubescent on the veins beneath, thin, very oblique at the base, usually sharply serrate, short-acuminate, 3-10 cm long; pedicels in fruit 1-2 cm. long, nearly glabrous; fruit globose, 7-10 mm in diameter, purple or blackish. Rocky places: Que.—N.C.—Okla.—w Neb.—Man. *Plain*. Ap—My.

2. *C. crassifolia* Lam. A tree occasionally 40 m. high; bark corky-roughened and warty; leaf-blades ovate or ovate-lanceolate, dark green, short-acuminate, usually coarsely toothed, 3-10 cm. long, hirsute beneath, especially on the veins; pedicels in fruit 1-2 cm. long; fruit globose or nearly so, 8-10 mm. in diameter, black. Woods and hillsides: Mass.—S.C.—Colo.—S.D. *Plain*—*Submont.* Ap—Je

3. *C. rugulosa* Rydb. A tree 5-10 m. high, with round crown; twigs somewhat pubescent when young; leaf-blades broadly ovate, oblique, 4-7 cm. long, somewhat cordate at the base, short-acuminate, sharply serrate except at the base and apex, dark green, shining and slightly scabrous above, brownish or yellowish green and dull beneath; fruit globose, about 8 mm. in diameter, brownish; style short but evident. *C. rugosa* Rydb., not Newberry. Valleys in the foothills: Colo. *Submont.* My.

4. *C. reticulata* Torr. A shrub 1-5 m. high; bark gray, corky-ridged; branchlets densely pubescent, brownish gray; leaf-blades broadly ovate, acute, cordate at the base, 2-4 cm. long, entire or with a few broad teeth, shining above, pale brown and densely hirsutulous beneath; fruit globose, 6-10 mm. in diameter, red. Dry rocky places: Tex.—Kans.—Colo.—N.M. *Son.*—*Staked Plains*. Ap.

5. *C. Douglasii* Planch. A low tree or shrub 5-10 m. high; twigs sparingly pubescent; leaf-blades oblique, lance-ovate or ovate, gradually acuminate or acute, more or less serrate, 2-6 cm. long, dark green above, light yellowish green and reticulate beneath; pedicels 10-15 mm. long; fruit greenish brown to nearly black, about 6 mm. in diameter, somewhat ellipsoid; style obsolete. Hills. Ore.—Utah—Ida.—B.C. *Submont.*—*Son.* Ap—Je.

FAMILY 35. CANNABINACEAE. HEMP FAMILY.

Herbs or vines, with mostly opposite leaves and persistent stipules. Staminate flowers in paniced racemes; sepals and stamens 5. Pistillate flowers in bracted spikes, with a cup-like calyx; pistil of 2 united carpels, but ovary 1-celled. Fruit an achene; seed solitary, pendulous.

Erect herbs; leaves digitately divided to near the base; pistillate flowers in axillary stiff spikes 1. *CANNABIS*.
Twining vines; leaves merely digitately lobed; pistillate flowers in drooping ament-like spikes with imbricate bracts. 2. *HUMULUS*.

1. *CANNABIS* L. HEMP.

Erect annual dioecious herbs. Leaves alternate or opposite, digitately 5-11-divided into serrate divisions. Staminate flowers in panicle racemes; sepals 5, imbricate; stamens 5. Pistillate flowers in leafy-bracted spikes; perianth undivided; pistil solitary. Fruit a slightly flattened achene.

1. *C. sativa* L. Stem branched, 1-4 m. high, rough-pubescent; leaf-blades divided into 5-11 linear, serrate, acuminate divisions, 5-15 cm. long. Waste places: N.B.—Ga.—Tenn.—Colo.—Minn.; escaped from cultivation, native of Eurasia.

2. *HUMULUS* L. HOPS.

Perennial, twining herbaceous vines. Leaves opposite, 3-7-lobed, serrate. Stipule persistent, free. Staminate flowers in panicle racemes; sepals 5, imbricate; stamens 5; filaments short, erect. Pistillate flowers in ament-like, drooping spikes, 2 together, subtended by a bract; ovary 1-celled. Achenes a little flattened. Embryo spirally coiled.

Leaf-blades 3-7-lobed about half-way to the base, with ovate, acute or short-acuminate lobes; those of the inflorescence 3-lobed or undivided 1 *H. Lupulus*
Leaf-blades 5-7-divided to near the base, with lanceolate, long-acuminate divisions, those of the inflorescence 5-cleft. 2 *H. neomexicanus*

1. *H. Lupulus* L. A vine 5-10 m. high; leaf-blades cordate in outline, dark green, scabrous above, glabrous beneath except the pubescent veins; lobes coarsely toothed, with ovate teeth; bracts of the pistillate flowers broadly ovate, from obtuse to short acuminate. COMMON HOPS. Rocky banks and copses: N.S.—Ga.—Kans.—Wyo.—Mont.; Eurasia; extensively cultivated. Plain—Submont.

2. *H. neomexicanus* (A. Nels. & Cockerell) Rydb. A vine 5-10 m. high; leaf-blades light green, minutely scabrous above, nearly glabrous beneath; bracts of the pistillate flowers narrower, lanceolate or ovate, acute or acuminate. *H. Lupulus neomexicanus* A. Nels. & Cockerell. WILD HOPS. Among bushes: Wyo.—Utah—Ariz.—N.M. Plain—Submont. J1—Au.

FAMILY 36. *URTICACEAE*. NETTLE FAMILY.

Monoecious, dioecious, or polygamous herbs (ours), often armed with stinging hairs. Leaves simple, alternate or opposite, with stipules. Flowers greenish, in axillary cymes. Calyx of 2-5 distinct or partly united sepals. Stamens 2-5, in the pistillary flowers reduced to staminodia or wanting. Pistil solitary; ovary 1-celled. Fruit an achene. Endosperm scant, oily, or wanting; embryo straight.

Herbs with stinging hairs, leaves opposite, flowers not involucre 1 *URTICA*.
Plants without stinging hairs; leaves alternate; flowers involucre by leafy bracts 2. *PARIETARIA*.

1. *URTICA* (Tourn.) L. NETTLE.

Annual or perennial herbs, with stinging hairs. Leaves opposite, with membranous, toothed, 5-7-veined blades and free stipules. Plants dioecious or monoecious; flowers in axillary, panicle cymes; sepals 4, nearly distinct, in the pistillate flowers two of them larger. Staminate flowers with 4 stamens and a rudimentary ovary, the pistillate ones with an equilateral ovary and tufted stigmas. Achenes flattened. Seeds with membranous coats, often adherent to the pericarp. All our species dioecious and perennial with a rootstock.

Stipules membranous, oblong or broadly lanceolate, obtuse or acutish, often 1 cm. long. Stem and leaves densely pubescent.

Stem and lower surface of the leaves coarsely velvety.

Stem finely strigose; lower surface of the leaves finely short-pubescent.

Stem nearly glabrous; leaves puberulent, in age becoming glabrate.

1. *U. holosericea*.

2. *U. Breweri*.

3. *U. Lyallii*.

Stipules narrowly lanceolate or linear, attenuate

Teeth of the leaves ovate, strongly directed forward

Stem glabrous except the presence of a few bristles; leaves thin, almost glabrous, not strongly veined

Petioles one-third to one-half as long as the cordate or broadly ovate leaf-blades 4 *U. cardiophylla*.

Petioles one-fifth to one-third as long as the lanceolate or ovate-lanceolate leaf-blades 5 *U. viridis*.

Stem more or less strigose or hirsute, leaves decidedly hairy, especially on the very strong veins

Leaf-blades lanceolate, scarcely cordate at the base.

Stem sparingly strigose and bristly

Stem densely strigose, scarcely at all bristly.

Leaf-blades broad, deeply cordate at base

Teeth of the leaves broadly triangular, not strongly directed forward; stem and leaves glabrous or nearly so 6 *U. gracilis*.

7. *U. strigosissima*.

8. *U. dioica*

9. *U. gracilentia*.

1. *U. holosericea* Nutt. Plant densely velvety; stem 1-3 m. high; leaf-blades thick, ovate or the lower cordate, coarsely toothed, 5-10 cm. long, pale beneath; staminate flowers in loose panicles, nearly equalling the upper leaves, the pistillate ones in shorter and denser clusters; inner sepals ovate, about equaling the achenes. Alluvial soil: Wash.—Ida.—Calif. *Son.*—*Submont.* Jl—Au.

2. *U. Breweri* S. Wats. Stem 1-2 m. high; leaf-blades lanceolate to cordate, coarsely toothed, rather thin, somewhat paler beneath; panicles shorter than in the preceding, the staminate ones shorter than the leaves, the pistillate slightly exceeding the petioles, sepals obovate, about twice as long as the achenes. River valleys: Wash.—Utah—Calif. *Submont.* Je—Au.

3. *U. Lyallii* S. Wats. Perennial, dioecious; stem 1-2 m. high; leaf-blades thin, coarsely toothed, 3-15 cm. long, ovate or cordate; panicles shorter than the leaves, the pistillate ones scarcely exceeding the petioles; sepals ovate, usually shorter than the achenes. Along streams: Alaska—Wash.; Newf.—Conn. *Submont.* My—S.

4. *U. cardiophylla* Rydb. Stem about 1 m. high; lower leaf-blades cordate, the upper lance-ovate, 6-10 cm. long, coarsely toothed, very thin, shining, dark green, glabrous; panicles small, few-flowered, much shorter than the leaves; sepals ovate, about equaling the achenes. Wooded creek banks: Mont.—Alta.—B C—Ida. *Submont.* Je—Au.

5. *U. viridis* Rydb. Stem 1-1.5 m. high, slender; blades coarsely toothed, 4-10 cm. long, thin, light green; panicles many-flowered, often equalling the upper leaves; sepals oval or ovate, usually half longer than the achene. River bottoms: Ida.—Wyo.—Alta. *Submont.* Je—Au.

6. *U. gracilis* Ait. Stem slender, 0.5-3 m. high, sharp-angled; leaf-blades finely serrate, acuminate, 7-15 cm. long, about as wide as the length of the petioles, flower-clusters slender, but shorter than the leaves; sepals ovate, about equaling the achenes. Alluvial soil and waste places: N.S.—N.C.—N.M.—Alaska *Plain*—*Mont.* Ap—S.

7. *U. strigosissima* Rydb. Stem 1 m. high or more; petioles 2-3 cm. long; leaf-blades sharply serrate, long-acuminate, 5-10 cm. long, 1.5-5 cm. wide; flower-clusters slender, the upper almost equaling the leaves; sepals ovate, about equaling the achenes. River banks: Ida.—Utah. *Submont.* July.

8. *U. dioica* L. Stem 0.5-1.5 m. high, strongly bristly and somewhat hispidulous above, obtusely angled; leaf-blades thin, very bristly, coarsely toothed, acute or short-acuminate, 3-10 cm. long, usually twice as broad as the length of the petioles; flower-clusters about half as long as the leaves. Waste places: N.S.—S.C.—Colo.—Minn.; nat. from Eu. *Plain*—*Submont.* Jl—S.

9. *U. gracilentia* Greene. Stem slender, 1-2 m. high, strigose or hirsutulous, as well as bristly; petioles slender, 2-8 cm. long; leaf-blades lanceolate, long-acuminate, rounded at the base, 5-15 cm. long, more or less pubescent, with salient teeth; flower-clusters slender, slightly exceeding the petioles. Along streams and in cañons: S.D.—Wyo.—Ariz.—Tex.; Mex. *Son.*—*Submont.* Au—S

2. PARIETARIA (Tourn.) L. PELLITORY.

Annual or perennial herbs, with diffusely branched, often pellucid stems, polygamous. Leaves alternate, with 3-veined blades. Involucres of 2-6, more or less united bracts. Flowers in axillary cymes. Perianth of 4, rarely 3, more or less united sepals. Stamens 4, rarely 3, in the perfect and the staminate flowers, in the pistillate ones wanting. Pistils solitary, in the staminate flowers rudimentary; stigmas tufted. Achenes included, with a crustaceous pericarp

Leaf-blades lanceolate, 2-7 cm. long, twice as long as the petioles or longer.

Plant comparatively dark green; stem densely puberulent, sepals lanceolate, acute

1. *P. pennsylvanica*

Plant very light green, stem long-villous; sepals ovate, often obtuse

2. *P. occidentalis*

Leaf-blades oblong or ovate-oblong, 0.5-2 cm. long, not twice as long as the petioles

3. *P. obtusa*.

1. *P. pennsylvanica* Muhl. Annual, slender; stem weak, ascending, 1-4 dm. high, simple or branched; leaf-blades thin and flimsy, obtuse or acuminate at the apex, acute or acuminate at the base; bracts of the involucre linear, 4-5 mm. long. Shaded banks or rocks: Ont.—Fla.—Mex.—B.C. *Plain—Submont.* My—Au.

2. *P. occidentalis* Rydb. Annual; stem slender, erect, simple or branched at the base, 1-4 dm. high; leaf-blades thin, light green, acute at the base, obtusish at the apex, 1-4 cm. long, 5-18 mm. wide, sparingly pubescent; bracts of the involucre linear, obtuse. Moist shaded places: Wash.—Ida.—Nev. *Submont.* My—Au.

3. *P. obtusa* Rydb. Annual; stem usually branched at the base, spreading, 5-20 cm. long, finely villous; leaf-blades obtuse; bracts of the involucre oblong or narrowly oblong, obtuse; sepals ovate, obtuse, rarely acutish. Shady places: Colo.—Utah—s Calif.—Tex. *Son.—Submont.* F—Jl.

FAMILY 37. POLYGONACEAE. BUCKWHEAT FAMILY.

Herbs or shrubs, or in the tropics trees or vines, with alternate leaves. Flowers perfect or rarely unisexual. Calyx inferior, of 2-6 more or less united sepals, often corolloid. Corolla wanting. Stamens 2-9. Pistil of 2 or 3 united carpels, but ovary 1-celled, in fruit becoming a 1-seeded, triangular or lenticular achene.

Leaves without stipules; flowers or flower-clusters subtended by involucre of partly united bracts, stamens mostly 9.

Involucres from tubular to campanulate, of several united bracts.

Involucres awnless, campanulate or turbinate, 4-8-toothed or -lobed

1. *ERIOGONUM*

Involucres awn-pointed

Involucres herbaceous, flowers exserted, achenes lenticular

2. *OXYTHECA*.

Involucres leathery or horny, flowers included, achenes 3-angled

Involucres with 3-6 awn-tipped spurs near the base, 1-3-flowered, in open dichotomous panicles.

3. *CENTROSTEGIA*

Involucres without spurs, 1-flowered.

Involucres 6-angled, sulcate, filaments adnate to the base of the perianth

4. *CHORIZANTHE*

Involucres 3-angled, filaments adnate to the whole tube of the perianth

5. *ACANTHOGONUM*

Involucres bract-like, 2-cleft

6. *PTEROSTEGIA*

Leaves with sheathing stipules (ocreae); flower-clusters not involucre, stamens 4-8

Stigmas tufted.

Sepals 6; styles 3, achenes triangular.

7. *RUMEX*.

Sepals 4, styles 2, achenes lenticular.

8. *OXYRIA*

Stigmas not tufted

Leaf-blades jointed at the base, ocreae 2-lobed, becoming lacerate, filaments, at least the inner, dilated.

9. *POLYGONUM*

Leaf-blades not jointed at the base, ocreae not 2-lobed, filaments slender

10. *PERSICARIA*.

Ocreae cylindric, truncate

Ocreae oblique, more or less open on the side facing the leaf

Herbs, not climbing or twining; sepals neither winged nor keeled

Flowers in simple spike-like racemes, plants with thickened tuberous rootstocks.

11. *BISTORTA*.

- Flowers in several racemes or panicles; rootstocks not tuberous-thickened
- Racemes in terminal corymbs, plants smooth
- Embryo in the center of the endosperm; leaves sagittate or cordate 12. FAGOPYRUM.
- Embryo at one side of the endosperm, leaves neither sagittate nor cordate 13. ACONOGONUM
- Racemes not in terminal corymbs, plant prickly; embryo at one side of the endosperm 14. TRACAULON.
- Herbaceous vines, with twining stems, sepals winged or keeled. 15. BILDERDYKIA.

1. ERIOGONUM Michx. UMBRELLA PLANT.

Annual or perennial herbs or shrubby plants, with basal or cauline, alternate, opposite, or whorled leaves and no stipules. Blades entire. Flowers perfect or polygamo-monoecious, in involucre clusters variously disposed. Involucres turbinate or campanulate, rarely nearly cylindric, 4-8-lobed. Perianth more or less colored, jointed to a short pedicel. Segments 6, in two series. Stamens 9; filaments filiform, often hairy at the base. Ovary 1-celled, 3-angled or 3-winged; styles 3.

- Achenes 3-winged, perianth not accrescent; perennials with a thick taproot and short crown I. ALATA.
- Achenes merely 3-angled; perianth accrescent in fruit
- Perianth with a stipe-like base; bracts verticillate, leaf-like
- Involucres in branching cymes, perennials with a branched woody caudex, flowering branches scapiform. II. ERIANTHA.
- Involucres in simple or compound umbel-like or head-like clusters.
- Perianth pubescent
- Perianth yellow, leaf-blades spatulate or oblanceolate
- Involucres undulate-dentate, tomentose, many, umbellate, embryo straight, perennials with a caespitose caudex III. FLAVA.
- Involucres deeply lobed, solitary, or 2 or 3 together, embryo curved, perennials, subcaulescent or suffruticose IV. CAESPITOSA.
- Perianth white, leaf-blades ovate or elliptic; caespitose subcaulescent perennials V. PYROLAEFOLIA
- Perianth glabrous; perennials with a caespitose caudex, with the leaves clustered at the ends of the branches VI. UMBELLATA
- Perianth without stipe-like base.
- Ovaries and fruit pubescent, involucres few, capitate or subcymose; perennials with scapiform stems. VII. LACHNOGYNA.
- Ovaries and fruit glabrous or nearly so.
- Involucres in head-like or umbellate clusters.
- Perianth-lobes very unequal, perennials with a pulvinate-caespitose woody caudex VIII. HETEROSEPALA.
- Perianth-lobes equal or nearly so.
- Heads solitary or, if more than one, proliferous-umbellate, with the central head sessile; caespitose perennials. IX. CAPITATA.
- Heads several, paniculate, corymbose or cymose-umbellate.
- Herbs with perennial caudices, heads paniculate, almost ebracteate, perennials with a stout rootstock. X. ELATA.
- Leafy undershrubs, with fascicled leaves; heads cymose-umbellate, suffruticose perennials XI. FASCICULATA.
- Involucres in open cymes
- Bracts scale-like
- Involucres, except those of the forks of the inflorescence, sessile, the uppermost conglomerate.
- Cymes repeatedly dichotomous or trichotomous.
- Perianth-lobes very dissimilar; perennials. XII. DICHOTOMA.
- Perianth-segments not very dissimilar.
- Perennials, shrubby at least at the base XIII. CORYMBOSA.
- Annuals, with a strict herbaceous stem. XIV. ANNUA.
- Cymes with more or less raceme-like branches.
- Perennials XV. RACEMOSA.
- Annuals. XVI. VIRGATA.
- Involucres all peduncled, never conglomerate; scapose annuals (except *E. tenellum*), leaves basal, petioled XVII. PEDUNCULATA
- Bracts leaf-like.
- Primary stem-leaves scale-like, with a pair or a fascicle of secondary well-developed leaves in their axils, caulescent annuals. XVIII. DIVARICATA.
- Primary stem-leaves well-developed, also often with secondary leaves in their axils
- Perianth petaloid, not closely investing the achenes; involucres toothed or lobed.

- Involucres sessile; leaves basal, petioled; bracts sessile, elliptic, scapose annuals XIX *PUBERULA*
 Involucres peduncled, leaves and bracts similar, verticillate, linear; caulescent annuals XX *SPERGULINA*
 Perianth herbaceous, closely investing the achene, involucre divided to near the base; leaves spatulate; caulescent annuals XXI. *SALSUGINOSA*

I. ALATA

- Involucres hairy, 3-3.5 mm long and 1.5-2 mm wide; stem and leaves manifestly hirsute and tomentose. 1 *E. alatum*.
 Involucres glabrous, 2-2.5 mm. long and of the same width, stem and leaves nearly glabrous. 2. *E. triste*.

II. ERIANTHA.

- Perianth whitish, style hairy at least to the middle. 3 *E. Jamesii*.
 Perianth yellow; style hairy only at the base.
 Involucres 6-8 mm. long; leaf-blades oblong or oblanceolate 4. *E. Bakeri*
 Involucres 9-10 mm long, leaf-blades suborbicular to oval 5 *E. arcuatum*.

III. FLAVA

- Perianth (externally) pubescent throughout
 Involucre elongated-obconic, 6-8 mm long 6. *E. Piperi*.
 Involucre turbinate, 4-5 mm long
 Stipe-like base of the perianth very short, old leaf-bases permanently tomentose
 Leaf-bases thickened; perianth copiously pubescent, leaf-blades silky above, involucre usually several 7 *E. flavum*.
 Leaf-bases not thickened, leaf-blades slightly floccose above, involucre few 8 *E. chloranthum*
 Perianth 6-7 mm long 9. *E. polyphyllum*.
 Perianth about 4 mm long
 Stipe-like base of the perianth slender, old leaf-bases glabrous 10 *E. xanthum*
 Perianth pubescent at the base only 11. *E. androsaceum*

IV. CAESPITOSA

- Involucres with comparatively short, ovate, merely spreading lobes, long-peduncled, leaves linear or nearly so, revolute, stems short, leafy 12. *E. thymoides*.
 Involucres with long reflexed lobes
 Densely caespitose, subcaulescent, involucre solitary 13 *E. caespitosum*
 Perianth in flowers 3-4 mm. long 14. *E. andinum*
 Perianth in flowers 2 mm. long
 Caulescent, suffruticose, involucre 1-5
 Perianth greenish yellow, 6-8 mm long, leaves spatulate or oblanceolate 15. *E. sphacelophalum*
 Perianth ochroleucous, 5 mm. long, leaves linear or linear-oblanceolate 16 *E. fasciculifolium*

V. PYROLAEFOLIA

- One species. 17. *E. pyrolaeifolium*

VI. UMBELLATA

- Leaf-blades ovate or cordate. 18 *E. compositum*
 Leaf-blades from obovate or orbicular to oblanceolate 19. *E. Porteri*.
 Involucres solitary
 Involucres several, umbellate.
 Perianth deeply yellow
 Leaves not densely tomentose beneath
 Umbels simple, leaves spatulate 20 *E. neglectum*
 Umbels more or less compound, leaves oblanceolate 21. *E. trumbellatum*
 Leaves densely tomentose beneath
 Inflorescence more or less compound. 22 *E. stellatum*.
 Inflorescence simple
 Leaf-blades obovate-spatulate or oval; perianth 6-7 mm long. 23 *E. umbellatum*
 Leaf-blades rhombic-ovate or rhombic-oval, perianth 7-8 mm long 24 *E. Rydbergii*
 Perianth ochroleucous, in age turning purplish rose-colored
 Scape naked up to the umbel, leaves spatulate
 Perianth about 6 mm long, leaf-blades spatulate-oblong or elliptic, glabrous above at maturity 25 *E. subalpinum*
 Perianth about 8 mm long; leaf-blades oval or ovate, permanently tomentose above 26 *E. aridum*
 Scape with at least one whorl of leaves below the umbel; leaf-blades oblanceolate 27. *E. heracleoides*

VII. LACHNOGYNA.

- Leaves and scape silky; the latter elongate, 1 dm high or more; perennials with a taproot and caespitose crown 28. *E. lachnogynum*
 Inflorescence irregularly branched 29. *E. Tetraneuris*
 Inflorescence subcapitate
 Leaves lanate, subsessile, obtuse, scape short, less than 3 cm. long, or none; pulvinate-caespitose perennials, involucre capitate.

- Leaf-blades elliptic or oval, not strongly revolute; scape 1-3 cm. long.
 Perianth yellow, lobes of the involucre lanceolate, more than twice as long as the tube 30. *E. longilobum*.
 Perianth white or pinkish; lobes of the involucre not twice as long as the tube.
 Lobes of the involucre oblong or ovate, with a more or less scarious white or pink margin. 31. *E. Shockleyi*.
 Lobes of the involucre triangular, not scarious-margined 32. *E. pulvinatum*.
 Leaf-blades linear-oblong, strongly revolute, scape none or very short. 33. *E. acaule*.

VIII. HETEROSEPALA.

- Heads several, cymose-proliferous, the central head sessile. 34. *E. proliferum*.
 Heads solitary.
 Involucres about 7 mm long, leaf-blades oval. 35. *E. orthocaulon*.
 Involucres 4-5 mm long. 36. *E. ovalifolium*.
 Perianth bright yellow or in age purplish, leaf-blades about as broad as long.
 Perianth cream-colored, ochroleucous, or isabel-colored.
 Perianth 2.5-3.5 mm. long, leaf-blades rounded-oval or ovate 37. *E. depressum*.
 Perianth 4-5 mm long; leaf-blades elliptic, oblong, or spatulate. 38. *E. ochroleucum*.

IX. CAPITATA.

- Perianth yellow
 Bracts and involucre membranous; the former broadly lanceolate; the lobes of the latter ovate or triangular; densely pulvinate-cespitose perennials.
 Perianth bright yellow 39. *E. chrysops*.
 Perianth ochroleucous, sometimes tinged with rose 40. *E. Kingii*.
 Bracts and involucre firm; the former subulate or narrowly lanceolate (except in *E. medium*), the lobes of the latter lanceolate, perennials with a caespitose woody caudex.
 Perianth ochroleucous. 41. *E. loganum*.
 Perianth golden yellow.
 Leaf-blades oblanceolate or oblong, tomentose on both sides. 42. *E. chrysocephalum*.
 Leaf-blades linear or narrowly linear-oblanceolate, in age greener above 43. *E. medium*.
 Perianth white or rose-colored
 Perianth glabrous; perennials with a caespitose woody caudex.
 Lobes of the involucre lanceolate, acute, not scarious-margined.
 Heads about 1 cm. broad, perianth fully 3 mm. long; leaf-blades 3-8 cm. long. 44. *E. Brandegei*.
 Heads about 0.5 cm. broad; perianth about 2 mm. long, leaf-blades 1-2 cm. long. 45. *E. depauperatum*.
 Lobes of the involucre oval to orbicular, scarious-margined.
 Leaves glabrate above, perianth 3-5 mm. long, involucre in small heads.
 Lobes of the involucre much shorter than the tube 46. *E. coloradense*.
 Lobes of the involucre about as long as the tube. 47. *E. pauciflorum*.
 Leaves white-tomentose on both sides; perianth 2.5 mm. long; involucre solitary. 48. *E. mancum*.
 Perianth pubescent
 Suffrutescent leafy-stemmed perennial, with decumbent branches, villous. 49. *E. multiceps*.
 Pulvinate perennial, acaulescent, silky-hirsute. 50. *E. villiflorum*.

X. ELATA.

- One species. 51. *E. elatum*.
 One species. 52. *E. polifolium*.

XII. DICHOTOMA.

- Stem leafy, suffrutescent; outer perianth-segments suborbicular. 53. *E. niveum*.
 Stem scapiform, with a caespitose woody caudex, outer perianth-segments oval.
 Inflorescence more or less floccose.
 Involucres 5-6 mm. long, branches of the inflorescence ascending-spreading. 54. *E. dichotomum*.
 Involucres 3-4 mm. long; branches of the inflorescence strongly ascending, almost erect. 55. *E. lachnostegium*.
 Inflorescence glabrous. 56. *E. strictum*.

XIII. CORYMBOSA.

- Branches of the inflorescence not grooved
 Perianth yellow.
 Plants more than 2 dm. high; leaves not heath-like.
 Leafy shrubs, inflorescence shorter than the stem.
 Leaf-blades elliptic, oval, or broadly spatulate; involucre glabrous. 57. *E. aureum*.
 Leaf-blades oblanceolate, involucre tomentose 58. *E. idahoense*.

- Undershrubs, leafy only at the base; inflorescence longer than the stem.
 Involucres villous-tomentose; leaf-blades equally white on both sides
 Leaf-blades narrowly oblanceolate; branches of the inflorescence strongly ascending. 59. *E. orendense*.
 Leaf-blades broadly spatulate; branches of the inflorescence more spreading. 60. *E. lagopus*.
 Involucres glabrate; leaves usually less tomentose above.
 Leaf-blades oblanceolate or broadly oblong, not strongly revolute.
 Involucres strongly angled, all sessile. 61. *E. Thompsonae*
 Involucres not strongly angled; those of the forks peduncled. 62. *E. campanulatum*
 Leaf-blades linear or narrowly linear-oblanceolate, usually with revolute margins
 Involucres in the forks peduncled. 63. *E. brevicaulis*
 Involucres all sessile. 64. *E. micranthum*
 Plants depressed, less than 1 dm high, with heath-like leaves. 65. *E. contortum*
- Perianth white or rose-colored
 Suffrutescent plants, leafy only at the base, inflorescence longer than the stem
 Involucres tomentose, all sessile. 66. *E. spathulatum*
 Involucres glabrous, at least in age
 Leaf-blades spatulate or elliptic.
 Pedicels of the lower forks scarcely longer than the involucres, lobes of the latter as broad as long; perianth 3 mm long. 67. *E. spathuliforme*
 Pedicels of the lower forks several times as long as the involucres, lobes of the latter longer than broad, perianth 2 mm long. 68. *E. Ostlundi*
- Leaf-blades narrowly oblanceolate to linear
 Involucres all sessile
 Leaves mostly flat; involucres narrowly turbinate, perianth 2-2.5 mm long. 69. *E. lonchophyllum*
 Leaves mostly revolute; involucres campanulate; perianth 3-3.5 mm long. 70. *E. nudicaule*
 Involucres in the forks of the inflorescence, at least the lower, distinctly peduncled
 Involucres broadly campanulate, about as wide as long. 71. *E. scoparium*.
 Involucres turbinate, decidedly longer than broad.
 Branches of the inflorescence almost erect. 72. *E. grangerense*.
 Branches of the inflorescence ascending-spreading
 Leaf-blades narrowly linear-oblanceolate or linear, usually revolute. 73. *E. tristichum*.
 Leaf-blades spatulate to oblanceolate, flat. 74. *E. salicinum*
- Shrubby plants, with the leafy stem usually longer than the inflorescence
 Leaves not revolute or scarcely so, distinctly petioled
 Leaf-blades relatively broad, oblong to rounded-oval or obovate, obtuse
 Involucres 4-5 mm long. 75. *E. Fendlerianum*
 Involucres 2-3 mm long.
 Branches of the inflorescence divaricate. 76. *E. divergens*.
 Branches of the inflorescence ascending
 Leaf-blades rounded or subcordate at the base, decidedly crisp
 Leaf-blades acutish at the base, not crisp, except sometimes the margins. 77. *E. Jonesii*
 Inflorescence and stem loosely floccose, in age inclined to become glabrate. 78. *E. corymbosum*
 Inflorescence and stem permanently and densely white-tomentose. 79. *E. salinum*.
 Leaf-blades narrow, spatulate to linear, mostly acute at the apex.
 Inflorescence many times compound, copiously branched, internodes long
 Inflorescence tomentulose, broom-like, with strongly ascending branches. involucres about 1.5 mm long. 80. *E. effusum*
 Inflorescence glabrous, lax and with spreading branches, involucres 2-2.5 mm long. 74. *E. salicinum*
 Inflorescence less compound, branches and internodes short, mostly spreading
 Involucres in the forks peduncled, peduncles slightly floccose. 81. *E. microthecum*.
 Involucres all sessile, peduncles densely white-tomentose. 82. *E. nebraskense*.
 Leaves linear or linear-oblanceolate, strongly revolute, subsessile
 Peduncles not thickened upwards.
 Leaves glabrous or loosely floccose above.
 Stem 1-4 dm high; leaves floccose above. 83. *E. Simpsoni*.
 Stem less than 1 dm. high; leaves glabrous above. 84. *E. Mearnsii*.

- Leaves densely villous on both sides. 85. *E. bicolor*.
 Peduncles clavate-thickened upwards. 86. *E. clacellatum*.
 Branches of the inflorescence strongly angled and deeply grooved 87. *E. sulcatum*.

XIV. ANNUA.

One species.

88. *E. annum*.

XV. RACEMOSA.

- Leaves crowded on the short branches of the caudex; blades abruptly narrowed at the base or subcordate 89. *E. racemosum*.
 Leaves scattered on the fruticose branches; blades tapering at the base
 Leaf-blades elliptic or oblanceolate. 90. *E. Wrightii*.
 Leaf-blades linear 91. *E. leptocladon*.

XVI. VIRGATA.

- Stem neither divaricately branched, nor densely floccose
 Involucres cylindric, perianth-segments oblong or oval; plant with few branches.
 Involucres about 3 mm. long. 92. *E. vimineum*.
 Involucres about 2 mm. long. 93. *E. Baileyi*.
 Involucres campanulate, 1-1.5 mm. long; perianth-segments cuneate, flabellate, or fiddle-shaped; plants with numerous branches.
 Branches not incurved in age; leaf-blades ovate or oblong. 94. *E. densum*.
 Branches incurved in age; leaf-blades orbicular or subreniform. 95. *E. nidularium*.
 Stem divaricately branched, densely floccose 96. *E. Plumetella*.

XVII. PEDUNCULATA.

- Perennials with a woody caudex. 97. *E. tenellum*.
 Annuals
 Perianth glabrous or in *E. Thomasii* and *E. nutans* somewhat pubescent; segments mostly obtuse or rounded at the apex
 Peduncles not glandular.
 Scape and its branches glabrous
 Peduncled reflexed or at least divaricate; leaves tomentose on both sides, less so above
 Involucres 1.5-2 mm. long; perianth 1.5-2 mm. long
 Peduncles shorter than the involucres, outer perianth-lobes ovate or subreniform
 Perianth pale yellow; outer segments subreniform
 Perianth white, outer segments ovate. 98. *E. Hookeri*.
 Peduncles longer than the involucres; outer perianth-segments obovate or panduriform; perianth white or pinkish 99. *E. deflexum*.
 Involucres 0.5 mm. long, perianth 1-1.5 mm. long, yellowish with reddish veins 100. *E. cernuum*.
 Peduncles erect or ascending 101. *E. Wetherillii*.
 Leaves more or less tomentose beneath.
 Involucres 1.5-2 mm. long
 Perianth yellow, segments similar 102. *E. pusillum*.
 Perianth white or rose-colored, segments unlike.
 Involucres campanulate, outer perianth-segments flabellate 103. *E. rotundifolium*.
 Involucres turbinate, outer perianth-segments not flabellate
 Outer perianth-segments oblong-ovate, the inner ones entire. 104. *E. insigne*.
 Outer perianth-segments subreniform, the inner ones 3-toothed, much smaller. 105. *E. turbinatum*.
 Involucres scarcely 1 mm. long; perianth yellowish or white, usually somewhat hispidulous at the base 106. *E. Thomasii*.
 Leaves green, glabrate or sparingly pilose 107. *E. Gordonii*.
 Scape more or less pubescent, at least at the nodes.
 Leaves white-lanate beneath. 108. *E. subreniforme*.
 Leaves green on both sides, sparingly pilose 109. *E. trinervium*.
 Peduncles glandular, leaves tomentose.
 Outer perianth-segments oval, emarginate or retuse, the inner ones oblong 110. *E. nutans*.
 Outer perianth-segments ovate-cordate, the inner ones oblong-ovate, acute. 111. *E. Parryi*.
 Perianth pubescent, segments ovate or lanceolate, acute.
 Peduncles and usually also the scape glandular, leaves green, merely hirsute beneath. 112. *E. glandulosum*.
 Peduncles and scape not glandular.
 Leaves floccose or tomentose beneath 113. *E. Ordii*.
 Leaves green, merely pilose or hirsute
 Accessory branches at the lower forks of the inflorescence many and nearly as strong as the primary ones; all divaricate
 Scape slightly if at all inflated. 114. *E. trichopodium*.

Scape strongly inflated under the first node. 115. *E. fusiforme*.
 Accessory branches of the lowest node of the inflorescence few and small
 or none; branches ascending, scape usually inflated 116. *E. inflatum*

XVIII DIVARICATA

Leaves green, puberulent; involucre 5-cleft usually sessile 117. *E. divaricatum*.
 Leaves floccose beneath, involucre 5-toothed, peduncled. 118. *E. angulosum*.

XIX. PUBERULA.

One species 119 *E. puberulum*

XX SPERGULINA.

Leaves green, merely pilose; scape glandular. 120. *E. spergulinum*
 Leaves tomentose beneath, scape finely pubescent 121. *E. pharnaceoides*

XXI. SALSUGINOSA

One species. 122 *E. salsuginosum*

1. *E. alatum* Torr. Stems erect, 3-10 dm. high; leaves mostly basal, tufted, spatulate or oblanceolate, 3-10 cm. long, hirsute above, glabrous beneath, except the strong midrib; panicle open; involucre in small cymes; perianth campanulate, greenish yellow, 2 mm. high, glabrous; achenes 5-7 mm. long, glabrous. Plains and table-lands: Neb.—Tex.—Ariz.—Wyo. Son.—Plain—Mont. Je—Au.

2. *E. triste* S. Wats. Stems 3-5 dm. high, sparingly hirsute or glabrate; leaves mostly basal, oblanceolate, 8-10 cm. long, ciliate on the margins, otherwise glabrous; inflorescence paniculate; involucre in cymes; perianth glabrous, campanulate, 2 mm. long, brownish red; achenes 5-6 mm. long. *E. alatum glabriusculum* Torr. Sandy soil: Tex.—s Colo.—s Utah—Ariz. Son.—Mont.

3. *E. Jamesii* Benth. Stems decumbent at the base, 1-3 dm. high, tomentose; leaves mostly basal, petioled, 3-8 cm. long; blades elliptic-spatulate, thick, green, densely white-tomentose beneath; involucre deeply campanulate, 5 mm. high, tomentose; perianth 4-5 mm., becoming 7-8 mm. long; inner lobes slightly longer than the outer; achenes 4 mm. long, pubescent at the base. Plains and hills: Tex.—Kans.—Colo.—Ariz. Plain—Mont. Jl—S.

4. *E. Bakeri* Greene. Stems scapiform, 1-3 dm. high; leaves basal, petioled, 2-5 cm. long, somewhat tomentose above, but in age more glabrate and greenish, densely white-tomentose beneath; involucre campanulate, tomentose; perianth silky-villous. *E. Jamesii flavescens* S. Wats. *E. vegetius* (T. & G.) A. Nels. Hills: Wyo.—N.M.—Ariz.—Utah. Submont.—Mont.

5. *E. arcuatum* Greene. Stems scapiform, about 1 dm. high, tomentose; leaves basal, petioled, 2-5 cm. long, tomentulose but greenish above, white-tomentose beneath; involucre tomentose; perianth 6-7 mm. long, silky below. Mountains: Colo.—Utah. Submont.—Subalp Jl.

6. *E. Piperi* Greene. Stems scapiform, 1-3 dm. high, villous; leaves basal, petioled, 3-10 cm. long; blades thin, oblanceolate or elliptic-oblanceolate, green and villous above, white-tomentose beneath; perianth yellow, 5-6 mm. long, turbinate; filaments hairy below; achenes villous at the apex. Open valleys Wash.—Wyo.—Mont. Submont.—Mont.

7. *E. flavum* Nutt. Stems 1-2 dm. high, scapiform, white-tomentose; leaves thick, petioled, 3-5 cm. long; blades oblanceolate, densely tomentose on both sides, greenish in age above, snowy-white beneath; perianth yellow; filaments villous at the base; achenes 4 mm. long, villous. *E. sericeus* Pursh. *E. crassifolius* Benth. Dry hills, mountains and cañons: Man.—Neb.—Colo.—Alta. Plain—Subalp.

8. *E. chloranthum* Greene. Stems scapiform, 1-2 dm. high, tomentose; leaves basal, not very thick, petioled, 3-5 cm. long; blades oblanceolate, somewhat tomentose, but green above, white-tomentose beneath; perianth orange or greenish orange. *E. aureum* Nutt., not M. E. Jones. *E. flavum* A. Nels., in part. Mountains: Colo.—Wyo. Subalp. Jl—Au.

9. *E. polyphyllum* Small. Stems scapiform, 1-1.5 dm. high; leaves basal, numerous, 1-3 cm. long; blades villous but green and glabrate above, densely

Stipules narrowly lanceolate or linear, attenuate.

Teeth of the leaves ovate, strongly directed forward

Stem glabrous except the presence of a few bristles; leaves thin, almost glabrous, not strongly veined

Petioles one-third to one-half as long as the cordate or broadly ovate leaf-blades 4. *U. cardiophylla*.

Petioles one-fifth to one-third as long as the lanceolate or ovate-lanceolate leaf-blades 5. *U. viridis*

Stem more or less strigose or hirsute, leaves decidedly hairy, especially on the very strong veins

Leaf-blades lanceolate, scarcely cordate at the base

Stem sparingly strigose and bristly

Stem densely strigose, scarcely at all bristly.

Leaf-blades broad, deeply cordate at base

Teeth of the leaves broadly triangular, not strongly directed forward; stem and leaves glabrous or nearly so 6. *U. gracilis*.

7. *U. strigosissima*.

8. *U. dioica*

9. *U. gracilentia*.

1. *U. holosericea* Nutt. Plant densely velvety; stem 1-3 m. high; leaf-blades thick, ovate or the lower cordate, coarsely toothed, 5-10 cm. long, pale beneath; staminate flowers in loose panicles, nearly equalling the upper leaves, the pistillate ones in shorter and denser clusters; inner sepals ovate, about equaling the achenes. Alluvial soil: Wash.—Ida.—Calif. Son.—Submont. Jl—Au.

2. *U. Breweri* S. Wats. Stem 1-2 m. high; leaf-blades lanceolate to cordate, coarsely toothed, rather thin, somewhat paler beneath; panicles shorter than in the preceding, the staminate ones shorter than the leaves, the pistillate slightly exceeding the petioles; sepals obovate, about twice as long as the achenes. River valleys: Wash.—Utah—Calif. Submont. Je—Au.

3. *U. Lyallii* S. Wats. Perennial, dioecious; stem 1-2 m. high; leaf-blades thin, coarsely toothed, 3-15 cm. long, ovate or cordate; panicles shorter than the leaves, the pistillate ones scarcely exceeding the petioles; sepals ovate, usually shorter than the achenes. Along streams: Alaska—Wash.; Newf.—Conn. Submont. My—S.

4. *U. cardiophylla* Rydb. Stem about 1 m. high; lower leaf-blades cordate, the upper lance-ovate, 6-10 cm. long, coarsely toothed, very thin, shining, dark green, glabrous; panicles small, few-flowered, much shorter than the leaves; sepals ovate, about equaling the achenes. Wooded creek banks: Mont.—Alta.—B.C.—Ida. Submont. Je—Au.

5. *U. viridis* Rydb. Stem 1-1.5 m. high, slender; blades coarsely toothed, 4-10 cm. long, thin, light green; panicles many-flowered, often equalling the upper leaves; sepals oval or ovate, usually half longer than the achene. River bottoms: Ida.—Wyo.—Alta. Submont. Je—Au.

6. *U. gracilis* Ait. Stem slender, 0.5-3 m. high, sharp-angled; leaf-blades finely serrate, acuminate, 7-15 cm. long, about as wide as the length of the petioles; flower-clusters slender, but shorter than the leaves; sepals ovate, about equaling the achenes. Alluvial soil and waste places: N.S.—N.C.—N.M.—Alaska Plain—Mont. Ap—S.

7. *U. strigosissima* Rydb. Stem 1 m. high or more; petioles 2-3 cm. long; leaf-blades sharply serrate, long-acuminate, 5-10 cm. long, 1.5-5 cm. wide; flower-clusters slender, the upper almost equaling the leaves; sepals ovate, about equaling the achenes. River banks: Ida.—Utah. Submont. July.

8. *U. dioica* L. Stem 0.5-1.5 m. high, strongly bristly and somewhat hispidulous above, obtusely angled; leaf-blades thin, very bristly, coarsely toothed, acute or short-acuminate, 3-10 cm. long, usually twice as broad as the length of the petioles; flower-clusters about half as long as the leaves. Waste places: N.S.—S.C.—Colo.—Minn.; nat. from Eu. Plain—Submont. Jl—S.

9. *U. gracilentia* Greene. Stem slender, 1-2 m. high, strigose or hirsutulous, as well as bristly; petioles slender, 2-8 cm. long; leaf-blades lanceolate, long-acuminate, rounded at the base, 5-15 cm. long, more or less pubescent, with salient teeth; flower-clusters slender, slightly exceeding the petioles. Along streams and in cañons: S.D.—Wyo.—Ariz.—Tex.; Mex. Son.—Submont. Au—S.

2. PARIETARIA (Tourn.) L. PELLITORY.

Annual or perennial herbs, with diffusely branched, often pellucid stems, polygamous. Leaves alternate, with 3-veined blades. Involucres of 2-6, more or less united bracts. Flowers in axillary cymes. Perianth of 4, rarely 3, more or less united sepals. Stamens 4, rarely 3, in the perfect and the staminate flowers, in the pistillate ones wanting. Pistils solitary, in the staminate flowers rudimentary; stigmas tufted. Achenes included, with a crustaceous pericarp.

Leaf-blades lanceolate, 2-7 cm. long, twice as long as the petioles or longer.

Plant comparatively dark green; stem densely puberulent; sepals lanceolate, acute

1. *P. pennsylvanica*

2. *P. occidentalis*

3. *P. obtusa*.

Leaf-blades oblong or ovate-oblong, 0.5-2 cm. long, not twice as long as the petioles

1. *P. pennsylvanica* Muhl. Annual, slender; stem weak, ascending, 1-4 dm. high, simple or branched; leaf-blades thin and flimsy, obtuse or acuminate at the apex, acute or acuminate at the base; bracts of the involucre linear, 4-5 mm. long. Shaded banks or rocks: Ont.—Fla.—Mex.—B.C. *Plain—Submont.* My—Au.

2. *P. occidentalis* Rydb. Annual; stem slender, erect, simple or branched at the base, 1-4 dm. high; leaf-blades thin, light green, acute at the base, obtusish at the apex, 1-4 cm. long, 5-18 mm. wide, sparingly pubescent; bracts of the involucre linear, obtuse. Moist shaded places: Wash.—Ida.—Nev. *Submont.* My—Au.

3. *P. obtusa* Rydb. Annual; stem usually branched at the base, spreading, 5-20 cm. long, finely villous; leaf-blades obtuse; bracts of the involucre oblong or narrowly oblong, obtuse; sepals ovate, obtuse, rarely acutish. Shady places: Colo.—Utah—s Calif.—Tex. *Son.—Submont.* F—Jl.

FAMILY 37. POLYGONACEAE. BUCKWHEAT FAMILY.

Herbs or shrubs, or in the tropics trees or vines, with alternate leaves. Flowers perfect or rarely unisexual. Calyx inferior, of 2-6 more or less united sepals, often corolloid. Corolla wanting. Stamens 2-9. Pistil of 2 or 3 united carpels, but ovary 1-celled, in fruit becoming a 1-seeded, triangular or lenticular achene.

Leaves without stipules; flowers or flower-clusters subtended by involucres of partly united bracts; stamens mostly 9

Involucres from tubular to campanulate, of several united bracts

Involucres awnless, campanulate or turbinate, 4-8-toothed or -lobed

1. **ERIOGONUM**

Involucres awn-pointed.

Involucres herbaceous; flowers exserted, achenes lenticular

2. **OXYTHECA.**

Involucres leathery or horny; flowers included, achenes 3-angled

Involucres with 3-6 awn-tipped spurs near the base, 1-3-flowered, in open dichotomous panicles.

3. **CENTROSTEGIA**

Involucres without spurs, 1-flowered.

Involucres 6-angled, sulcate; filaments adnate to the base of the perianth.

4. **CHORIZANTHE**

Involucres 3-angled; filaments adnate to the whole tube of the perianth

5. **ACANTHOGONUM**

6. **PTEROSTEGIA**

Involucres bract-like, 2-cleft.

Leaves with sheathing stipules (ocreae); flower-clusters not involucreate, stamens 4-8

Stigmas tufted.

Sepals 6, styles 3; achenes triangular.

7. **RUMEX.**

Sepals 4, styles 2, achenes lenticular.

8. **OXYRIA.**

Stigmas not tufted

Leaf-blades jointed at the base; ocreae 2-lobed, becoming lacerate, filaments, at least the inner, dilated.

9. **POLYGONUM.**

Leaf-blades not jointed at the base; ocreae not 2-lobed; filaments slender

Ocreae cylindric, truncate

10. **PERSICARIA**

Ocreae oblique, more or less open on the side facing the leaf

Herbs, not climbing or twining, sepals neither winged nor keeled.

Flowers in simple spike-like racemes; plants with thickened tuberous rootstocks.

11. **BISTORTA.**

- Flowers in several racemes or panicles; rootstocks not tuberous-thickened
 Racemes in terminal corymbs, plants smooth.
 Embryo in the center of the endosperm; leaves sagittate or cordate 12. FAGOPYRUM.
 Embryo at one side of the endosperm, leaves neither sagittate nor cordate. 13. ACONOGONUM.
 Racemes not in terminal corymbs; plant prickly; embryo at one side of the endosperm 14. TRACALON.
 Herbaceous vines, with twining stems, sepals winged or keeled. 15. BILDERDYKIA.

1. ERIÖGONUM Michx. UMBRELLA PLANT.

Annual or perennial herbs or shrubby plants, with basal or cauline, alternate, opposite, or whorled leaves and no stipules. Blades entire. Flowers perfect or polygamo-monoecious, in involucre clusters variously disposed. Involucres turbinate or campanulate, rarely nearly cylindric, 4-8-lobed. Perianth more or less colored, jointed to a short pedicel. Segments 6, in two series. Stamens 9; filaments filiform, often hairy at the base. Ovary 1-celled, 3-angled or 3-winged; styles 3.

- Achenes 3-winged, perianth not accrescent; perennials with a thick taproot and short crown I. ALATA.
 Achenes merely 3-angled; perianth accrescent in fruit
 Perianth with a stipe-like base, bracts verticillate, leaf-like
 Involucres in branching cymes, perennials with a branched woody caudex; flowering branches scapiform II. ERIANTHA
 Involucres in simple or compound umbel-like or head-like clusters.
 Perianth pubescent
 Perianth yellow, leaf-blades spatulate or oblanceolate
 Involucres undulate-dentate, tomentose, many, umbellate; embryo straight, perennials with a caespitose caudex. III. FLAVA.
 Involucres deeply lobed, solitary, or 2 or 3 together, embryo curved; perennials, subcaulescent or suffruticose. IV. CAESPITOSA.
 Perianth white, leaf-blades ovate or elliptic, caespitose subcaulescent perennials V. PYROLAEFOLIA
 Perianth glabrous, perennials with a caespitose caudex, with the leaves clustered at the ends of the branches. VI. UMBELLATA
 Perianth without stipe-like base.
 Ovaries and fruit pubescent, involucres few, capitate or subcymose; perennials with scapiform stems VII. LACHNOGYNA.
 Ovaries and fruit glabrous or nearly so.
 Involucres in head-like or umbellate clusters
 Perianth-lobes very unequal, perennials with a pulvinate-caespitose woody caudex. VIII. HETEROSEPALA.
 Perianth-lobes equal or nearly so
 Heads solitary or, if more than one, proliferous-umbellate, with the central head sessile, caespitose perennials. IX. CAPITATA.
 Heads several, paniculate, corymbose or cymose-umbellate.
 Herbs with perennial caudices; heads paniculate, almost ebracteate; perennials with a stout rootstock. X. ELATA.
 Leafy undershrubs, with fascicled leaves; heads cymose-umbellate, suffruticose perennials. XI. FASCICULATA.
 Involucres in open cymes.
 Bracts scale-like.
 Involucres, except those of the forks of the inflorescence, sessile, the uppermost conglomerate.
 Cymes repeatedly dichotomous or trichotomous.
 Perianth-lobes very dissimilar; perennials. XII. DICHOTOMA.
 Perianth-segments not very dissimilar.
 Perennials, shrubby at least at the base XIII. CORYMBOSA.
 Annuals, with a strict herbaceous stem XIV. ANNUA.
 Cymes with more or less raceme-like branches
 Perennials XV. RACEMOSA.
 Annuals. XVI. VIRGATA
 Involucres all peduncled, never conglomerate; scapose annuals (except *E. tenellum*); leaves basal, petioled XVII. PEDUNCULATA.
 Bracts leaf-like.
 Primary stem-leaves scale-like, with a pair or a fascicle of secondary well-developed leaves in their axils, caulescent annuals. XVIII. DIVARICATA.
 Primary stem-leaves well-developed, also often with secondary leaves in their axils.
 Perianth petaloid, not closely investing the achenes; involucres toothed or lobed.

- Involucres sessile; leaves basal, petioled; bracts sessile, elliptic, scapose annuals XIX. PUBERULA
 Involucres peduncled; leaves and bracts similar, verticillate, linear, caulescent annuals. XX. SPERGULINA
 Perianth herbaceous, closely investing the achene; involucre divided to near the base, leaves spatulate, caulescent annuals XXI. SALSUGINOSA

I. ALATA.

- Involucres hairy, 3-3.5 mm long and 1.5-2 mm wide, stem and leaves manifestly hirsute and tomentose 1. *E. alatum*
 Involucres glabrous, 2-2.5 mm. long and of the same width, stem and leaves nearly glabrous. 2. *E. triste*

II. ERIANTHA.

- Perianth whitish, style hairy at least to the middle 3. *E. Jamesii*
 Perianth yellow, style hairy only at the base
 Involucres 6-8 mm long, leaf-blades oblong or oblanceolate 4. *E. Bakeri*
 Involucres 9-10 mm long, leaf-blades suborbicular to oval 5. *E. arcuatum*

III. FLAVA.

- Perianth (externally) pubescent throughout
 Involucre elongated-obconic, 6-8 mm long 6. *E. Piperi*
 Involucre turbinate, 4-5 mm long
 Stipe-like base of the perianth very short, old leaf-bases permanently tomentose
 Leaf-bases thickened, perianth copiously pubescent, leaf-blades silky above, involucre usually several 7. *E. flavum*
 Leaf-bases not thickened, leaf-blades slightly floccose above, involucre few 8. *E. chloranthum*
 Perianth 6-7 mm long 9. *E. polyphyllum*
 Perianth about 4 mm long
 Stipe-like base of the perianth slender; old leaf-bases glabrous 10. *E. xanthum*
 Perianth pubescent at the base only. 11. *E. androsaceum*

IV. CAESPITOSA

- Involucres with comparatively short, ovate, merely spreading lobes, long-peduncled, leaves linear or nearly so, revolute, stems short, leafy 12. *E. thymoides*
 Involucres with long reflexed lobes
 Densely caespitose, subcaulescent, involucre solitary 13. *E. caespitosum*
 Perianth in flowers 3-4 mm long. 14. *E. andinum*
 Perianth in flowers 2 mm long
 Caulescent, suffruticose, involucre 1-5
 Perianth greenish yellow, 6-8 mm long, leaves spatulate or oblanceolate 15. *E. sphaerocephalum*
 Perianth ochroleucous, 5 mm long, leaves linear or linear-oblanceolate. 16. *E. fasciculifolium*

V. PYROLAEFOLIA.

- One species. 17. *E. pyrolaeifolium*

VI. UMBELLATA.

- Leaf-blades ovate or cordate 18. *E. compositum*
 Leaf-blades from obovate or orbicular to oblanceolate. 19. *E. Porteri*.
 Involucres solitary.
 Involucres several, umbellate.
 Perianth deeply yellow.
 Leaves not densely tomentose beneath
 Umbels simple, leaves spatulate 20. *E. neglectum*.
 Umbels more or less compound, leaves oblanceolate 21. *E. biumbellatum*
 Leaves densely tomentose beneath
 Inflorescence more or less compound 22. *E. stellatum*
 Inflorescence simple
 Leaf-blades obovate-spatulate or oval, perianth 6-7 mm long 23. *E. umbellatum*
 Leaf-blades rhombic-ovate or rhombic-oval, perianth 7-8 mm. long 24. *E. Rydbergii*.
 Perianth ochroleucous, in age turning purplish rose-colored.
 Scape naked up to the umbel, leaves spatulate
 Perianth about 6 mm long; leaf-blades spatulate-oblong or elliptic, glabrous above at maturity 25. *E. subalpinum*
 Perianth about 8 mm. long; leaf-blades oval or ovate, permanently tomentose above. 26. *E. aridum*
 Scape with at least one whorl of leaves below the umbel, leaf-blades oblanceolate. 27. *E. heracleoides*

VII. LACHNOGYNA

- Leaves and scape silky; the latter elongate, 1 dm. high or more, perennials with a taproot and caespitose crown 28. *E. lachnogynum*
 Inflorescence irregularly branched 29. *E. Tetraneuris*
 Inflorescence subcapitate
 Leaves lanate, sessile, obtuse; scape short, less than 3 cm. long, or none, pulvinate-caespitose perennials, involucre capitate.

- Leaf-blades elliptic or oval, not strongly revolute; scape 1-3 cm. long.
 Perianth yellow; lobes of the involucre lanceolate, more than twice as long as the tube. 30 *E. longilobum*.
 Perianth white or pinkish; lobes of the involucre not twice as long as the tube.
 Lobes of the involucre oblong or ovate, with a more or less scarious white or pink margin. 31 *E. Shockleyi*.
 Lobes of the involucre triangular, not scarious-margined.
 Leaf-blades linear-oblong, strongly revolute; scape none or very short. 32 *E. pulvinatum*.
 33 *E. acaule*.
- VIII. HETEROSEPALA.
 Heads several, cymose-proliferous, the central head sessile. 34 *E. proliferum*.
 Heads solitary. 35 *E. orthocaulon*.
 Involucres about 7 mm. long, leaf-blades oval. 36 *E. ovalifolium*.
 Involucres 4-5 mm. long.
 Perianth bright yellow or in age purplish, leaf-blades about as broad as long.
 Perianth cream-colored, ochroleucous, or isabel-colored.
 Perianth 2.5-3.5 mm. long, leaf-blades rounded-oval or ovate. 37 *E. depressum*.
 Perianth 4-5 mm. long; leaf-blades elliptic, oblong, or spatulate. 38 *E. ochroleucum*.
- IX. CAPITATA.
 Perianth yellow.
 Bracts and involucre membranous, the former broadly lanceolate; the lobes of the latter ovate or triangular, densely pulvinate-caespitose perennials.
 Perianth bright yellow. 39 *E. chrysops*.
 Perianth ochroleucous, sometimes tinged with rose. 40 *E. Kingii*.
 Bracts and involucre firm, the former subulate or narrowly lanceolate (except in *E. medium*), the lobes of the latter lanceolate, perennials with a caespitose woody caudex. 41 *E. loganum*.
 Perianth ochroleucous.
 Perianth golden yellow.
 Leaf-blades oblanceolate or oblong, tomentose on both sides. 42 *E. chrysocephalum*.
 Leaf-blades linear or narrowly linear-oblanceolate, in age greener above. 43 *E. medium*.
- Perianth white or rose-colored.
 Perianth glabrous, perennials with a caespitose woody caudex.
 Lobes of the involucre lanceolate, acute, not scarious-margined.
 Heads about 1 cm. broad, perianth fully 3 mm. long; leaf-blades 3-8 cm. long. 44 *E. Brandegei*.
 Heads about 0.5 cm. broad, perianth about 2 mm. long, leaf-blades 1-2 cm. long. 45 *E. depauperatum*.
 Lobes of the involucre oval to orbicular, scarious-margined.
 Leaves glabrate above, perianth 3-5 mm. long; involucre in small heads.
 Lobes of the involucre much shorter than the tube. 46 *E. coloradense*.
 Lobes of the involucre about as long as the tube. 47 *E. pauciflorum*.
 Leaves white-tomentose on both sides; perianth 2.5 mm. long; involucre solitary. 48 *E. mancum*.
 Perianth pubescent.
 Suffruticose leafy-stemmed perennial, with decumbent branches, villous. 49 *E. multiceps*.
 Pulvinate perennial, acaulescent, silky-hirsute. 50 *E. villosiflorum*.
- X. ELATA. 51 *E. elatum*.
- XI. FASCICULATA. 52 *E. polifolium*.
- XII. DICHOTOMA.
 Stem leafy, suffrutescent; outer perianth-segments suborbicular. 53 *E. niveum*.
 Stem scapiform, with a caespitose woody caudex, outer perianth-segments oval.
 Inflorescence more or less floccose.
 Involucres 5-6 mm. long, branches of the inflorescence ascending-spreading. 54 *E. dichotomum*.
 Involucres 3-4 mm. long; branches of the inflorescence strongly ascending, almost erect. 55 *E. lachnostegium*.
 Inflorescence glabrous. 56 *E. strictum*.
- XIII. CORYMBOSEA.
 Branches of the inflorescence not grooved.
 Perianth yellow.
 Plants more than 2 dm. high, leaves not heath-like.
 Leafy shrubs; inflorescence shorter than the stem.
 Leaf-blades elliptic, oval, or broadly spatulate, involucre glabrous. 57 *E. aureum*.
 Leaf-blades oblanceolate; involucre tomentose. 58 *E. idahoense*.

- Undershrubs, leafy only at the base; inflorescence longer than the stem.
 Invulcres villous-tomentose; leaf-blades equally white on both sides
 Leaf-blades narrowly oblanceolate; branches of the inflorescence strongly ascending 59. *E. orendense*.
 Leaf-blades broadly spatulate; branches of the inflorescence more spreading 60. *E. lagopus*.
 Invulcres glabrate; leaves usually less tomentose above
 Leaf-blades oblanceolate or broadly oblong, not strongly revolute
 Invulcres strongly angled, all sessile 61. *E. Thompsonae*
 Invulcres not strongly angled, those of the forks peduncled 62. *E. campanulatum*
 Leaf-blades linear or narrowly linear-oblanceolate, usually with revolute margins
 Invulcres in the forks peduncled. 63. *E. brevicaule*
 Invulcres all sessile. 64. *E. micranthum*
 Plants depressed, less than 1 dm high, with heath-like leaves 65. *E. contortum*
- Perianth white or rose-colored
 Suffrutescent plants, leafy only at the base; inflorescence longer than the stem
 Invulcres tomentose, all sessile. 66. *E. spathulatum*
 Invulcres glabrous, at least in age.
 Leaf-blades spatulate or elliptic.
 Pedicels of the lower forks scarcely longer than the involucres, lobes of the latter as broad as long; perianth 3 mm long. 67. *E. spathuliforme*
 Pedicels of the lower forks several times as long as the involucres; lobes of the latter longer than broad; perianth 2 mm long. 68. *E. Ostlundii*.
- Leaf-blades narrowly oblanceolate to linear.
 Invulcres all sessile
 Leaves mostly flat, involucres narrowly turbinate; perianth 2-2.5 mm long 69. *E. lonchophyllum*
 Leaves mostly revolute, involucres campanulate; perianth 3-3.5 mm long 70. *E. nudicaule*
 Invulcres in the forks of the inflorescence, at least the lower, distinctly peduncled
 Invulcres broadly campanulate, about as wide as long 71. *E. scoparium*.
 Invulcres turbinate, decidedly longer than broad.
 Branches of the inflorescence almost erect. 72. *E. grangerense*
 Branches of the inflorescence ascending-spreading
 Leaf-blades narrowly linear-oblanceolate or linear, usually revolute. 73. *E. tristichum*
 Leaf-blades spatulate to oblanceolate, flat. 74. *E. salicinum*
- Shrubby plants, with the leafy stem usually longer than the inflorescence
 Leaves not revolute or scarcely so, distinctly petioled.
 Leaf-blades relatively broad, oblong to rounded-oval or obovate, obtuse
 Invulcres 4-5 mm long 75. *E. Fendlerianum*
 Invulcres 2-3 mm long.
 Branches of the inflorescence divaricate 76. *E. divergens*
 Branches of the inflorescence ascending
 Leaf-blades rounded or subcordate at the base, decidedly crisp 77. *E. Jonesii*.
 Leaf-blades acutish at the base, not crisp, except sometimes the margins.
 Inflorescence and stem loosely floccose, in age inclined to become glabrate. 78. *E. corymbosum*
 Inflorescence and stem permanently and densely white-tomentose 79. *E. salinum*.
- Leaf-blades narrow, spatulate to linear, mostly acute at the apex
 Inflorescence many times compound, copiously branched, internodes long
 Inflorescence tomentulose, broom-like, with strongly ascending branches, involucres about 1.5 mm long 80. *E. effusum*
 Inflorescence glabrous, lax and with spreading branches, involucres 2-2.5 mm long 74. *E. salicinum*
 Inflorescence less compound, branches and internodes short, mostly spreading
 Invulcres in the forks peduncled; peduncles slightly floccose 81. *E. microthecum*.
 Invulcres all sessile, peduncles densely white-tomentose 82. *E. nebraskense*.
 Leaves linear or linear-oblanceolate, strongly revolute, subsessile.
 Peduncles not thickened upwards
 Leaves glabrous or loosely floccose above
 Stem 1-4 dm. high; leaves floccose above 83. *E. Simpsoni*.
 Stem less than 1 dm. high; leaves glabrous above. 84. *E. Mearnsii*.

- Leaves densely villous on both sides 85 *E. bicolor*.
 Peduncles clavate-thickened upwards 86 *E. clavellatum*.
 Branches of the inflorescence strongly angled and deeply grooved 87. *E. sulcatum*.

XIV. ANNUA.

One species

88. *E. annuum*

XV. RACEMOSA.

- Leaves crowded on the short branches of the caudex; blades abruptly narrowed at the base or subcordate 89 *E. racemosum*
 Leaves scattered on the fruticose branches; blades tapering at the base 90 *E. Wrightii*
 Leaf-blades elliptic or oblanceolate. 91. *E. leptoclados*.
 Leaf-blades linear.

XVI. VIRGATA.

- Stem neither divaricately branched, nor densely floccose.
 Involucres cylindric, perianth-segments oblong or oval; plant with few branches. 92 *E. vimineum*.
 Involucres about 3 mm. long. 93. *E. Baileyi*.
 Involucres about 2 mm. long.
 Involucres campanulate, 1-1.5 mm long; perianth-segments cuneate, flabellate, or fiddle-shaped, plants with numerous branches
 Branches not incurved in age; leaf-blades ovate or oblong. 94 *E. densum*.
 Branches incurved in age; leaf-blades orbicular or subreniform. 95. *E. nidularium*.
 Stem divaricately branched, densely floccose 96 *E. Plumetella*.

XVII. PEDUNCULATA

Perennials with a woody caudex.

97 *E. tenellum*.

Annuals

Perianth glabrous or in *E. Thomastii* and *E. nutans* somewhat pubescent; segments mostly obtuse or rounded at the apex.

Peduncles not glandular

Scape and its branches glabrous

Peduncled reflexed or at least divaricate; leaves tomentose on both sides, less so above

Involucres 1.5-2 mm long, perianth 1.5-2 mm. long.

Peduncles shorter than the involucres; outer perianth-lobes ovate or subreniform

Perianth pale yellow, outer segments subreniform.

Perianth white; outer segments ovate 98. *E. Hookeri*.Peduncles longer than the involucres; outer perianth-segments 99 *E. deflexum*.

obovate or panduriform; perianth white or pinkish

Involucres 0.5 mm. long, perianth 1-1.5 mm 100. *E. cernuum*.

dish veins long, yellowish with red- 101. *E. Wetherillii*.

Peduncles erect or ascending.

Leaves more or less tomentose beneath.

Involucres 1.5-2 mm long

Perianth yellow; segments similar 102. *E. pusillum*.

Perianth white or rose-colored, segments unlike

Involucres campanulate; outer perianth-segments flabellate.

103. *E. rotundifolium*.

Involucres turbinate; outer perianth-segments not flabellate

Outer perianth-segments oblong-ovate, the inner ones entire.

Outer perianth-segments subreniform, the inner ones 3- 104. *E. insignis*toothed, much smaller 105 *E. turbinatum*.

Involucres scarcely 1 mm long; perianth yellowish or white, usually somewhat hispidulous at the base

Leaves green, glabrate or sparingly pilose. 106. *E. Thomastii*.107 *E. Gordonii*.

Scape more or less pubescent, at least at the nodes.

Leaves white-lanate beneath

Leaves green on both sides, sparingly pilose 108 *E. subreniforme*.109. *E. trinervatum*.

Peduncles glandular, leaves tomentose.

Outer perianth-segments oval, emarginate or retuse, the inner ones oblong

110. *E. nutans*.Outer perianth-segments ovate-cordate, the inner ones oblong-ovate, acute. 111. *E. Parryi*.

Perianth pubescent; segments ovate or lanceolate, acute.

Peduncles and usually also the scape glandular, leaves green, merely hirsute beneath. 112. *E. glandulosum*.

Peduncles and scape not glandular

Leaves floccose or tomentose beneath. 113. *E. Ordii*.

Leaves green, merely pilose or hirsute.

Accessory branches at the lower forks of the inflorescence many and nearly as strong as the primary ones; all divaricate

Scape slightly if at all inflated. 114. *E. trichopodium*.

Scape strongly inflated under the first node 115. *E. fusiforme*.
 Accessory branches of the lowest node of the inflorescence few and small
 or none; branches ascending, scape usually inflated 116 *E. inflatum*.

XVIII. DIVARICATA.

Leaves green, puberulent; involucre 5-cleft usually sessile. 117. *E. divaricatum*.
 Leaves floccose beneath; involucre 5-toothed, peduncled. 118. *E. angulosum*

XIX. PUBERULA

One species 119. *E. puberulum*

XX SPERGULINA.

Leaves green, merely pilose; scape glandular 120 *E. spergulinum*
 Leaves tomentose beneath; scape finely pubescent 121. *E. pharnaceoides*

XXI SALSUGINOSA

One species. 122. *E. salsuginosum*

1. ***E. alatum*** Torr. Stems erect, 3-10 dm. high; leaves mostly basal, tufted, spatulate or oblanceolate, 3-10 cm. long, hirsute above, glabrous beneath, except the strong midrib; panicle open; involucre in small cymes; perianth campanulate, greenish yellow, 2 mm. high, glabrous; achenes 5-7 mm. long, glabrous. Plains and table-lands: Neb.—Tex.—Ariz.—Wyo. *Son.—Plain—Mont.* Je—Au.

2. ***E. triste*** S. Wats. Stems 3-5 dm. high, sparingly hirsute or glabrate; leaves mostly basal, oblanceolate, 8-10 cm. long, ciliate on the margins, otherwise glabrous; inflorescence paniculate; involucre in cymes; perianth glabrous, campanulate, 2 mm. long, brownish red; achenes 5-6 mm. long. *E. alatum glabrusculum* Torr. Sandy soil: Tex.—s Colo.—s Utah—Ariz. *Son.—Mont.*

3. ***E. Jamesii*** Benth. Stems decumbent at the base, 1-3 dm. high, tomentose; leaves mostly basal, petioled, 3-8 cm. long; blades elliptic-spatulate, thick, green, densely white-tomentose beneath; involucre deeply campanulate, 5 mm. high, tomentose; perianth 4-5 mm., becoming 7-8 mm. long; inner lobes slightly longer than the outer; achenes 4 mm. long, pubescent at the base. Plains and hills: Tex.—Kans.—Colo.—Ariz. *Plain—Mont.* Jl—S.

4. ***E. Bakeri*** Greene. Stems scapiform, 1-3 dm. high; leaves basal, petioled, 2-5 cm. long, somewhat tomentose above, but in age more glabrate and greenish, densely white-tomentose beneath; involucre campanulate, tomentose; perianth silky-villous. *E. Jamesii flavescens* S. Wats. *E. vegetius* (T. & G.) A. Nels Hills: Wyo.—N.M.—Ariz.—Utah. *Submont.—Mont.*

5. ***E. arcuatum*** Greene. Stems scapiform, about 1 dm. high, tomentose; leaves basal, petioled, 2-5 cm. long, tomentulose but greenish above, white-tomentose beneath; involucre tomentose; perianth 6-7 mm. long, silky below. Mountains: Colo.—Utah. *Submont.—Subalp.* Jl.

6. ***E. Piperi*** Greene. Stems scapiform, 1-3 dm. high, villous; leaves basal, petioled, 3-10 cm. long; blades thin, oblanceolate or elliptic-oblanceolate, green and villous above, white-tomentose beneath; perianth yellow, 5-6 mm. long, turbinate; filaments hairy below; achenes villous at the apex. Open valleys: Wash.—Wyo.—Mont. *Submont.—Mont.*

7. ***E. flavum*** Nutt. Stems 1-2 dm. high, scapiform, white-tomentose; leaves thick, petioled, 3-5 cm. long; blades oblanceolate, densely tomentose on both sides, greenish in age above, snowy-white beneath; perianth yellow; filaments villous at the base; achenes 4 mm. long, villous. *E. sericeus* Pursh. *E. crassifolius* Benth. Dry hills, mountains and cañons: Man.—Neb.—Colo.—Alta. *Plain—Subalp.*

8. ***E. chloranthum*** Greene. Stems scapiform, 1-2 dm. high, tomentose; leaves basal, not very thick, petioled, 3-5 cm. long; blades oblanceolate, somewhat tomentose, but green above, white-tomentose beneath; perianth orange or greenish orange. *E. aureum* Nutt., not M. E. Jones. *E. flavum* A. Nels., in part. Mountains: Colo.—Wyo. *Subalp.* Jl—Au.

9. ***E. polyphyllum*** Small. Stems scapiform, 1-1.5 dm. high; leaves basal, numerous, 1-3 cm. long; blades villous but green and glabrate above, densely

Fruit erect.

Inflorescence of small axillary clusters scattered more or less throughout the plant, all except *P. minimum* with elongated stems or branches; perianth-lobes never keeled near the apex.

Plants copiously leafy throughout; upper leaves scarcely reduced and more crowded.

Very slender and low annuals, with red wiry, terete, non-striate stems.

1. *P. minimum*.

Stouter and larger plants, often perennial, with prominently striate stems, usually 3-8 dm long.

Perianth-lobes with yellowish green margins; plant erect, with spreading branches in age, leaves broad, yellowish green. 2. *P. erectum*.

Perianth-lobes with white, pink or purplish margins, plant prostrate or diffusely spreading, leaves from bright to pale bluish green.

Leaves thick, prominently veined, oblong, oval, or spatulate, obtuse or rounded at the apex, usually pale, ocreae very conspicuous; faces of the achenes granular. 3. *P. buriforme*.

Leaves thin, not prominently veined, bright green; ocreae not conspicuous, faces of the achenes finely striate.

Perianth 2.5-3.5 mm. long; achenes 2.5-3 mm. long, acute; leaves 2-4 cm long. 4. *P. aviculare*.

Perianth 2-2.5 mm. long, achenes 2-2.5 mm. long, acuminate, leaves mostly less than 2 cm long. 5. *P. neglectum*.

Plants with the upper leaves more scattered and reduced, mostly erect perennials.

Upper bracts not subulate, achenes mostly dull.

Lobes of the perianth with yellowish margins, perianth 3-4 mm. long; achenes about 3 mm long, nearly smooth. 6. *P. ramosissimum*.

Lobes of the perianth with whitish or pinkish margins, perianth 2-3 mm. long, achenes 2-2.5 mm. long, distinctly granulate or striate.

Plant copiously branched and broom-like, leaf-blades linear or nearly so, achenes granulate. 7. *P. prostratum*.

Plant sparingly branched, mostly below; leaf-blades oblanceolate to elliptic; achenes finely striate. 8. *P. rubescens*.

Upper bracts subulate; achenes smooth and shining. 9. *P. saucichense*.

Inflorescence aggregate at the ends of the branches, or more scattered in *P. paronychioides*, in which, however, some of the perianth-lobes are keeled near the apex; bracts leaf-like and usually broader than the narrowly linear leaves; plants dwarf annuals.

Perianth-lobes not keeled.

Leaves several, gradually merging into the bracts, achenes blunt-angled and strongly striate. 10. *P. Watsonii*.

Leaf usually solitary and much longer than the bracts; achenes sharp-angled and obscurely striate. 11. *P. unifolium*.

Some of the perianth-lobes keeled near the apex.

Bracts herbaceous or the uppermost with a very narrow scarious margin.

Bracts linear, ocreae conspicuous, inflorescence interrupted.

Bracts oblong or narrowly oblong, ocreae inconspicuous; inflorescence contiguous and dense. 12. *P. paronychioides*.

Bracts with broad white petaloid margins. 13. *P. Kelloggii*.

Bracts with broad white petaloid margins. 14. *P. polygaloides*.

Fruit reflexed.

Upper bracts much reduced and subulate.

Perianth 1.5-2.5 mm. long, leaves narrowly linear. 15. *P. Engelmannii*.

Perianth 3-5 mm. long.

Outer perianth-lobes oblong, obtusish, thickened and green or purplish on the back; lower leaves oblanceolate to linear-oblanceolate. 16. *P. Douglasii*.

Outer perianth-lobes obovate, rounded at the apex, merely with a narrow midrib, lower leaves linear.

Inflorescence long, lax, virgate; ocreae of the bracts inconspicuous.

17. *P. majus*.

Inflorescence dense, crowded at the ends of the branches, ocreae of the

bracts contiguous and conspicuous. 18. *P. spargulariforme*.

Upper bracts foliaceous, relatively broad lanceolate or oblong.

Perianth 3.5-4 mm. long; lower leaves oblong or nearly so.

Achenes included.

Achenes exserted.

Perianth 2-2.5 mm. long, lower leaves obovate, very acute.

19. *P. montanum*.

20. *P. commixtum*.

21. *P. Austinae*.

1. *P. minimum* S. Wats. Annual; stem erect or spreading, 3-20 cm, rarely 30 cm. high, branched mostly at the base; leaves obovate, sometimes ovate or elliptic, 0.5-2 cm. long, evenly distributed or crowded above; perianth-segments 1.5-2 mm. long, greenish with rose-colored margins; achenes 2-2.3 mm. long, smooth and shining. *P. Torreyi* S. Wats. Dry or sandy slopes: B.C.—Mont.—Calif. *Submont.* J1-S.

2. *P. erectum* L. Annual; stem usually erect, 2-6 dm. high, yellowish green; leaves oval, elliptic or obovate, 1-6 cm. long; flowers in small axillary

clusters; perianth 3 mm. long; achenes dark brown, granular and dull. Waste places: Me.—Ga.—Ark.—N.M.—Alta.; (? Ida.) *Plain*. Je-S.

3. *P. buxiforme* Small. Annual or perennial; stem usually prostrate, 3-12 dm. long; leaves oblong, elliptic or oblanceolate, 0.5-2.5 cm. long, usually obtuse, often crisp on the margin; perianth 2-2.5 mm. long; achenes 2-2.5 mm. long, dark brown, mostly dull, granular. Sandy or alkaline soil: Ont.—Va.—Tex.—Nev.—B.C. *Plain—Mont.* Je-S.

4. *P. aviculare* L. Annual or sometimes perennial; leaves oblong-lanceolate, acute at both ends, petioled, dull bluish green, rather thin, 1-3 cm. long; flowers pedicelled; perianth 2.5-3.5 mm. long; achenes dark, rugulose-striate, dull. Waste places: Newf.—Va.—Calif.—B.C.; nat. or adv. from Eu. *Plain—Submont.* My-O.

5. *P. neglectum* Besser. Annual or perennial; stems with short internodes, strongly striate, usually minutely roughened; leaves firm, narrowly elliptic-lanceolate, or the upper rarely linear; margins often revolute when dry; perianth 2-2.5 mm. long, venose; segments with usually purplish margins; achenes reddish brown, apiculate-acuminate. *P. aviculare angustissimum* Meisn. Waste places: Me.—Fla.—Ark.—N.M.—Alta.; nat. or adv. from Eu.; more common than *P. aviculare*. *Plain—Submont.* Je-N.

6. *P. ramosissimum* Michx. Annual; stem 2-10 dm. high, somewhat virgate, yellowish green; leaves lanceolate, oblong, or linear-oblong, 1-4 cm. long, yellowish green, the upper ones much reduced in size; perianth about 3 mm. long; achenes 3 mm. long, black, not shining. River valleys and sandy soil: Man.—Ill.—N.M.—Nev.—Wash.—B.C. *Plain—Mont.* Jl-S.

7. *P. prolificum* (Small) B. L. Robins. Annual; stem 3-5 dm. high, much branched, strongly striate, dark green or reddish; leaves linear-oblong or linear, thick, obtuse or acute, strongly veined beneath, dark green, 1-2 cm. long; perianth about 2 mm. long; achenes brown, 2 mm. long, concave on the lanceolate-deltoid faces, shining. (?) *P. flexile* Greene. Sandy places: Me.—Va.—Colo.—Mont. *Plain*. Jl-O.

8. *P. rubescens* Small. Annual or perennial; stem erect, ultimately branched, 1-5 dm. high; leaves thick, narrowly oblong or elliptic, 1-2.5 cm. long, the upper reduced; perianth 3 mm. long; achenes 2-2.5 mm. long, dull. Sandy soil: Sask.—Colo.—Nev.—Ida. *Plain—Submont.* Je-S.

9. *P. sawatchense* Small. Annual; stems erect, striate, obscurely 4-angled, branched from the base, 5-30 cm. high; lower leaves oblanceolate, 1-2 cm. long, acute or obtuse at the apex, often more or less revolute, with a prominent mid-vein; perianth-segments green, only slightly lighter on the margins, 2 mm. long; achenes rather blunt at both ends, smooth and glossy. Hillsides and mountains: S.D.—N.M.—Calif.—Wash. *Submont.—Mont.* Jl-Au.

10. *P. Watsonii* Small. Annual; stem erect, 5-15 cm. high, sparingly branched, 4-angled, glabrous; leaves linear, 1-5 cm. long; bracts reduced, 0.5-1 cm. long, linear-lanceolate; perianth-segments green, pinkish on the margins, 2 mm. long; achenes nearly black, narrowly ovoid, strongly striate. *P. imbricatum* Nutt., not Raf. *P. confertiflorum* Nutt. Wet places: B.C.—Sask.—N.M.—Calif. *Plain—Mont.* Je-Au.

11. *P. unifolium* Small. Annual, dwarf; stem 1-3 cm. high, simple, or nearly so; well developed leaf mostly solitary, linear, erect, 7-10 mm. long; bracts several, crowded, imbricate, linear or linear-lanceolate; perianth-segments about 1.5 mm. long, white or pinkish, with green ribs; achenes about 1.3 mm. long, shining, included. Wet places: Mont.—Colo.—Utah. *Plain—Mont.* Jl-Au.

12. *P. paronychioides* Small. Annual, bushy; stem copiously branched at the base, 8-15 cm. long; leaves linear, 8-10 mm. long; perianths short-pedicelled, solitary or a few together in the axils; segments green, with pale or pink margins, becoming fully 2 mm. long; lobes slightly keeled, acutish; achenes rhombic, about 2 mm. long, granular. Wet places: Mont.—Wyo. *Submont.* Au.

13. *P. Kelloggii* Greene. Annual; stem erect, 3-8 cm. high, branched at the base; leaves linear, acute, 5-10 cm. long, spreading; perianth-segments 1.5-2

mm. long, greenish, with white or cream-colored margins; achenes 1.5 mm. long, rhombic-ovoid, light brown, granular, somewhat striate, dull. In wet soil: Wash.—Mont.—Colo.—Calif. *Submont.*—Mont. JI-S.

14. *P. polygaloides* Meisn. Annual, glabrous; stem slender, erect, 1-2 dm. high, with ascending branches; leaves narrowly linear, 1-3 cm. long, strict; floral leaves oblong or elliptic; perianth-segments 2 mm. long, white or pinkish, with dark midribs, outer segment longer than the inner; achenes about 1.5 mm. long. Wet places: Wash.—Mont.—Wyo.—Ore. *Submont.* Je-Au.

15. *P. Engelmannii* Greene. Annual; stem often diffusely branched at the base, 0.5-3 dm. high; lower leaves linear-oblanccolate, 0.5-2 cm. long, the upper reduced, bract-like, subulate; perianth-segments oblong, obtuse, with whitish margins; achenes 2-2.5 mm. long, ovoid, black, smooth and shining. *P. tenue microspermum* Engelm. Hillsides and mountains: B.C.—Mont.—Colo. *Plain*—Mont. JI-S.

16. *P. Douglasii* Greene. Annual; stem erect, 2-4 dm. high, with ascending branches; lower leaves oblanceolate, 2-5 cm. long, mostly obtuse or acutish; the upper linear and reduced, scattered; perianth-segments white or rose-colored on the margins; achenes 3-4 mm. long, black, smooth and shining. *P. consimile* Greene (?) *P. emaciatum* A. Nels. *P. pannosum* S. S. Sharp. Hillsides and in sandy soil. Vt.—N.Y.—N.M.—Calif.—B.C.; probably only introduced east of the Rockies. *Plain*—Mont. Je-Au.

17. *P. majus* (Meisn.) Piper. Annual; stem wiry, terete, 2-4 dm. high, with ascending branches; leaves 2-6 cm. long; bracts linear-subulate, remote; perianth 4-5 mm. long; segments white, with green midrib; achenes black, shining, smooth, 3-3.5 mm. long. *P. coarctatum majus* Meisn. Stony soil: Wash.—Mont.—Wyo.—Ore. *Plain*—*Submont.* Je-S.

18. *P. spergulariaeforme* Meisn. Annual, scurfy throughout; stem erect, 1-3 dm. high, branched from the base; leaves 1-3 cm. long, usually somewhat revolute; bracts rather crowded, subulate; perianth 3.5-4 mm. long, pink; achenes about 3.5 mm. long, black, smooth and shining except the granular apex and angles. *P. coarctatum* Dougl., not Willd. Ridges: B.C.—Wyo.—Calif. *Plain*—*Submont.* JI-Au.

19. *P. montanum* (Small) Greene. Annual; stem branched from the base, 1-3 dm. high, floriferous from near the base; lower leaves elliptic or oblong-oblanceolate, 1-3 cm. long, 1-nerved; upper leaves smaller, lanceolate or oblong; perianth-segments oblong, dark green or purplish, with white or pinkish margins; achenes black, shining, striate. Mountains: Alta.—N.M.—Calif. *Submont.*—*Subalp.* JI-Au.

20. *P. commixtum* Greene. Annual; stem 0.5-1.5 dm. high, glabrous, branched from the base, glabrous; leaves oval, oblanceolate, or lanceolate, abruptly cuspidate-mucronate, 1-2.5 cm. long, 1-nerved, glabrous; perianth about 3 mm. long; segments elliptic, green, with yellowish white or purplish margins; achenes almost black, smooth and shining. Mountains: Colo.—Mont. *Submont.*—*Subalp.* JI-Au.

21. *P. Austinae* Greene. Annual; stem mostly erect, 0.5-1 dm. high, branched from the base; leaves ovate-lanceolate to oblanceolate, 0.5-1.5 cm. long, the upper much reduced; perianth green, 2.5 mm. long, drooping; segments narrowly oblong, obtuse, dark green, with white margins; achenes 2.5-3 mm. long, black, smooth and shining. Sandy places: Alta.—Wyo.—Calif. *Submont.*—*Subalp.* Au-S.

10. **PERSICARIA** (C. Bauhin) Mill. SMARTWEED, LADY'S THUMB, WATER PEPPER.

Perennial or annual, caulescent herbs, not twining, with alternate leaves and entire leaf-blades, continuous with the ocreae. The latter cylindric, mostly membranous, truncate. Racemes spike-like; pedicels articulate below the calyx. Calyx more or less colored, white or greenish, glandular-punctate; perianth-segments mostly 5. Stamens 4-8, filaments not dilated. Ovary 1-celled, 1-ovuled;

styles mostly 2, sometimes 3, usually partially united; stigmas capitate. Achenes mostly lenticular, sometimes 3-angular, usually black, smooth or granular. Endosperm horny; cotyledons accumbent.

Racemes terminal only and usually solitary; plants aquatic perennials.

Ocreae without spreading foliaceous tops.

Plant usually floating, or decumbent and rooting, leaves of an oblong type, glabrous, acute or obtuse 1 *P. coccinea*

Plant usually diffuse and emersed; leaves of a lanceolate type, pubescent, acuminate. 2 *P. Muhlenbergii*

Ocreae with spreading foliaceous tops, leaf-blades narrowly oblong or lanceolate (broader in floating forms), pubescent 3 *P. Hartwrightii*

Racemes axillary as well as terminal, numerous; annuals.

Ocreae without marginal bristles.

Racemes erect; glands on the branches and inflorescence numerous, stalked.

4. *P. omissa*

Racemes drooping; glands on the branches and inflorescence sessile.

5. *P. incarnata*

Styles united only at the base

Styles united to about the middle

Leaves deep green on both sides.

6. *P. lapathifolia*

Leaves pale beneath.

7. *P. incana*

Ocreae bristle-fringed.

Racemes oblong or cylindric, about 1 cm. thick in fruit, perianth not punctate, usually pink to red-purple 8. *P. Persicaria*

Racemes slender, loosely flowered, about 5 mm. thick in fruit; perianth white or pale green, copiously punctate.

Racemes erect, achenes smooth and shining.

9. *P. punctata*

Racemes nodding at least in fruit; achenes granular and dull.

10. *P. Hydropteryx*

1. *P. coccinea* (Muhl.) Greene. Perennial, glabrous, or the young shoots somewhat pubescent; stem 5-50 dm. long; leaves oblong or elliptic, 3-10 cm. long, glossy, obtuse or acute at both ends, or when growing in mud more elongate, elliptic-lanceolate and acute; racemes spike-like, 1-3 cm. long; perianth light rose-colored; achenes lenticular, black. *Polygonum amphibium* Hook., not L. *Persicaria plattensis*, *P. subcoriacea*, *P. psychrophila*, *P. oregana*, and *P. laetevirens* Greene. In water or rarely in mud: Me.—N.J.—N.M.—Calif.—Alaska. *Plain—Mont. Je—Au.*

2. *P. Muhlenbergii* (Meisn.) Small. Perennial, more or less strigose-hispid throughout; stem erect or creeping at the base, 3-8 dm. high, simple; leaf-blades broadly lanceolate, 5-20 cm. long, acuminate or acute; racemes spike-like, linear or linear-oblong, 3-10 cm. long; perianth dark rose-colored, rarely pink, 4 mm. long; achenes lenticular, black, granular but shining. *Polygonum Muhlenbergii* (Meisn.) S. Wats. *P. emersum* (Michx.) Britton. *Persicaria emersa* (Michx.) Small. *P. propinqua* and *P. Wardii* Greene. In swamps and shallow water: Me.—Va.—N.M.—Calif.—B.C.; Mex. *Plain—Submont. Je—S.*

3. *P. Hartwrightii* (A. Gray) Greene. Perennial, more or less hispid throughout; stem ascending or suberect, 3-7 dm. long, or rarely floating in water, leaf-blades narrowly lanceolate or oblong-lanceolate or oblong, 6-18 cm. long; raceme spike-like, oblong or ovoid, 1-3 cm. long, erect; perianth rose-colored, 3-4.5 cm. long; achenes lenticular, 2.5 mm. long, black, smooth and shining. *Polygonum Hartwrightii* A. Gray. *Persicaria muriculata* and *P. villosula* Greene. Wet places and shallow water. Me.—Pa.—Calif.—Wash.—Sask. *Plain—Submont. Je—S.*

4. *P. omissa* Greene. Annual; stem 3-6 dm. high, with copious stipitate glands; ocreae short, cup-shaped; leaf-blades 5-10 cm. long, lanceolate or oblong-lanceolate, glabrous, punctate; racemes short-oblong or ellipsoid, 1-2 cm. long; perianth deep pink, about 4 mm. long; achenes round-ovate, black and shining, nearly flat on one side. *Polygonum omisum* Greene. Wet ground and dried-up ponds: Kans.—Colo. *Plain. Jl—S.*

5. *P. incarnata* (Ell.) Small. Annual, nearly glabrous throughout; stem erect, 6-10 dm. long, more or less thickened at the nodes; leaf-blades lanceolate or linear-lanceolate, 5-20 cm. long, acuminate or acute; racemes linear, 3-8 cm. long, drooping; perianth whitish, green, or rose-colored, 2-3 mm. long; achenes lenticular, rarely 3-angled, dark brown or black, shining, smooth. *Polygonum incarnatum* Ell. Wet places: Vt.—Fla.—Calif.—Ida. *Plain—Submont. Jl—O.*

6. **P. lapathifolia** (L.) S. F. Gray. Annual, glabrous or nearly so; stem erect, 3-6 dm. high, thickened at the nodes; leaf-blades broadly or narrowly lanceolate, 5-20 cm. long, attenuate, punctate and ciliolate on the margins; racemes linear-oblong, 2-8 cm. long, drooping, dense; perianth flesh-colored or whitish, 2-2.5 mm. long; achenes lenticular or rarely 3-angled, black or dark brown, slightly granular, shining. *Polygonum lapathifolium* L. Wet places: Que.—Fla.—Calif.—B.C.; Mex., W. Ind.; Eurasia. Plain—Submont. Jl—O.

7. **P. incana** (Schmidt) S. F. Gray. Annual; stem erect, 1-4 dm. high, slightly scurfy; leaf-blades lanceolate or oblong, acute or obtuse; racemes oblong, 1-3 cm. long, erect or only slightly nodding; peduncles with sessile glands; perianth 2-2.5 mm. long, greenish or pinkish white; achenes lenticular, dark brown, shining. *Polygonum incanum* Schmidt. Wet places and swamps: Newf.—N.Y.—Colo.—B.C.; Eu. Plain—Submont. Je—S.

8. **P. Persicaria** (L.) Small. Annual, glabrous or puberulent; stem erect, 2-8 dm. high, usually branched; leaf-blades lanceolate or linear-lanceolate, 2-18 cm. long, acuminate, conspicuously punctate, usually with a lunar or triangular spot in the middle; racemes oblong or ovoid, 1-3 cm. long, 0.5-1 cm. thick, mostly erect; perianth about 2.5 mm. long, pink or purple; achenes lenticular or 3-angled, smooth and shining. *Polygonum Persicaria* L. LADY'S THUMB. Waste places and rich soil: Newf.—Fla.—Calif.—B.C.; Mex.; Eu. Plain—Submont. My—S.

9. **P. punctata** (Ell.) Small. Annual or perennial, mostly glabrous throughout; stem erect, or creeping at the base, 3-10 dm. high, more or less branched; leaf-blades lanceolate to linear-lanceolate, 5-15 cm. long, acuminate, conspicuously punctate; raceme linear, erect, 1-6 cm. long, somewhat interrupted below; perianth greenish, about 2 mm. long, conspicuously glandular-punctate, achenes lenticular or 3-angled, black, smooth and shining. *Polygonum punctatum* Ell. *P. acre* H.B.K., not Lam. SMARTWEED. Swamps and wet places: Mc.—Fla.—Calif.—Wash.; Mex., C. Am., W. Ind., and S. Am. Plain. Mr—D.

10. **P. Hydropiper** (L.) Opiz. Annual, glabrous; stem erect or assurgent, 2-6 dm. high, simple or branched, sometimes reddish; leaf-blades ovate-lanceolate or lanceolate, 1.5-9 cm. long, acute, more or less papillose, punctate; racemes linear, 2-6 cm. long, interrupted and drooping; perianth greenish, 2.5-3 mm. long, glandular; achenes lenticular or 3-angled, dark brown, strongly granular and dull. *Polygonum Hydropiper* L. WATER PEPPER. Wet places: Newf.—Ga.—Calif.—B.C.; Mex. and C. Am.; nat. from Eu. Plain. Je—S.

11. **BISTORTA** (C. Bauhin) Mill. BISTORT.

Perennials, with thickened horizontal rootstocks and simple stems. Basal leaves long-petioled; stem-leaves short-petioled or sessile, narrow, entire. Ocreae cylindric, hyaline, never ciliate, oblique at the summit. Inflorescence a solitary spike-like raceme, sometimes bearing bulblets at the base. Pedicels articulate at the base of the perianth. Perianth 5-parted, not glandular-punctate. Stamens 8, exserted. Style usually 3-parted; achenes triangular or rarely lenticular. Endosperm horny; cotyledons accumbent.

Racemes not viviparous, not bulblet-bearing, oblong, 1-2 cm. thick.

Perianth 5-6 mm. long, leaf-blades lanceolate, oblong, or oblanceolate.

Perianth 3-4 mm. long, basal leaf-blades linear
 Racemes viviparous, bulblet-bearing below, linear, 5-8 mm. thick.

1. *B. bistortoides*.

2. *B. linearifolia*.

3. *B. vivipara*.

1. **B. bistortoides** (Pursh) Small. Stem erect, 2-7 dm. high, simple; blades of the basal leaves 10-25 cm. long, 0.5-3 cm. broad, acute or obtuse, glabrous on both sides or scabrous-puberulent beneath; stem-leaves lanceolate, sessile; raceme oblong, 1-6 cm. long, 1-1.5 cm. thick, densely flowered; perianth light rose-colored to white; achenes light brown, smooth and shining. *Polygonum bistortoides* Pursh. *B. calophylla*, *B. glastifolia*, and *B. lilacina* Greene. Wet meadows and swamps: Mont.—N.M.—Calif.—B.C. Alp.—Mont. Je—S.

2. **B. linearifolia** (S. Wats.) Greene. Stem slender, 1-3 dm. high; basal leaf-blades 3-4 cm. long, acute; cauline leaves linear-lanceolate to linear, sessile;

raceme ovoid, less than 2 cm. long; perianth mostly white; achenes smooth and shining. *Polygonum Bistorta linearifolium* S. Wats. *B. jejuna* Greene. Alpine swamps: Mont.—Colo.—Utah—Nev. *Alp.*—*Mont.* Je—Au.

3. *B. vivipara* (L.) S. F. Gray. Blades of the basal leaves oblong or lanceolate, 2–10 cm. long, 1–2.5 cm. wide; stem-leaves lanceolate to linear; raceme narrowly cylindric, 2–10 cm. long, 0.5–1 cm. thick; perianth pale rose-colored or white; achenes dark brown, granular and dull. *Polygonum viviparum* L. *B. scopulina* Greene. Alpine, arctic, and subarctic swamps: Greenl.—N.H.—N.M.—Alaska; Eurasia. *Alp.*—*Mont.* Je—Au.

12. FAGOPYRUM (Tourn.) Mill. BUCKWHEAT.

Caulescent glabrous annuals. Leaves alternate, petioled; blades hastate or cordate, ocreae oblique, entire. Flowers perfect, several in corymbiform cymes, with slender pedicels subtended by an ocreola. Calyx corolloid; sepals 5. equal. Stamens 8. Styles 3; stigmas capitate. Achenes 3-angled, margined or crested. Embryo S-shaped, central.

1. *F. Fagopyrum* (L.) Karst. Stem 1–9 dm. high, branched, pubescent at the nodes; leaf-blades hastate, 2.5–8 cm. long; ocreae fugacious; perianth whitish; achenes ovoid, 5 mm. long, with pinnately striate faces, acute-angled. *F. esculentum* Moench. Escaped from cultivation; native of Eurasia.

13. ACONÓGONUM Reichenb.

Caulescent herbaceous or rarely suffrutescent plants, with horizontal rootstocks. Leaves fleshy or thin. Inflorescence of axillary and terminal racemes or panicles. Ocreae funnelform, oblique. Pedicels articulate below the perianth. Perianth 5-parted, not glandular-punctate. Stamens 5–8, included. Style 3-parted; achenes 3-angled, smooth. Endosperm horny; cotyledons accumbent.

1. *A. phytolaccaefolium* (Meisn.) Small. Perennial; stem erect, 1–2 m. high, channeled, branched; leaf-blades lanceolate, 5–15 cm. long, 1–4 cm. wide, acute or acuminate at both ends, slightly crisped, ciliate on the margins; inflorescence paniculate, leafy; perianth greenish or whitish, 3 mm. long; segments obovate or oblong, rounded; achenes 4 mm. long, broadly ovoid or oval, light chestnut-colored, shining. *Polygonum polymorphum* and *P. alpinum* Am. auth. Subalpine and alpine regions: Alaska—Ida.—Nev.—Calif.; Asia. *Submont.* Jl—S

14. TRACAULON Raf. TEAR-THUMB.

Annual or rarely perennial, prickly-armed herbs, with weak 4-angled stems. Leaves alternate; blades hastate or cordate, membranous, the petioles and veins prickly. Ocreae oblique. Flowers in terminal or axillary spikes, or capitate clusters. Sepals 4 or 5, somewhat colored, neither keeled nor winged. Stamens 5–8; filaments not dilated. Ovary 1-celled; styles 2 or 3, partially united. Achenes lenticular or 3-angled, smooth and shining. Endosperm horny; cotyledons accumbent.

1. *T. sagittatum* (L.) Small. Annual; stem slender, decumbent or reclining, 3–15 dm. high, branched, 4-angled, armed on the angles with sharp recurved prickles; leaves lanceolate or oblong, sagittate at the base, 1–12 cm. long, 0.5–3 cm. broad, the lower petioled, the uppermost sessile; perianth white, green, or red, 4 mm. long, 5-parted; achenes 3-angled, black or brownish. *Polygonum sagittatum* L. Wet meadows: Newf.—Fla.—Tex.—Sask. *Plain.* Jl—S.

15. BILDERDYKIA Dum. FALSE BUCKWHEAT, BINDWEED.

Annual or perennial twining herbaceous vines. Leaves alternate, with cordate or hastate blades. Ocreae oblique, naked or fringed. Racemes loosely flowered, terminal or axillary, often paniculate. Sepals 5, green, white, or yellowish, the outer two sepals and the intermediate one keeled or winged. Pedicels slender, reflexed and articulate. Stamens 8; filaments short, converging. Ovary 1-celled; styles 3, short or almost wanting; stigmas capitate. Achenes

3-angled, dark brown or black. Endosperm horny. Cotyledons accumbent. [*Tinaria* Reichenb.]

(Outer sepals merely keeled at maturity.
Outer sepals developing conspicuous wings.

1. *B. Convolvulus*.
2. *B. scandens*.

1. *B. Convolvulus* (L.) Dum. Annual, glabrous but scurfy, pale green, stem ascending and twining, 1-12 dm. long; leaf-blades ovate-sagittate or deltoid, 2-6 cm. long, acuminate at the apex; racemes 1-6 cm. long; perianth green, 3.5-4 mm. long; segments oblong, obtuse; achenes 3-angled, 3.5 mm. long, black, granular. *Polygonum Convolvulus* L. *Tinaria Convolvulus* Webb. & Moq. BINDWEED. Among bushes: N.S.—Fla.—Calif.—B.C.; nat. from Eu. *Plain*—Mont. My-S

2. *B. scandens* (L.) Greene. Perennial, glabrous, somewhat scurfy; stem extensively twining, 5-30 dm. high; leaf-blades ovate-cordate to oblong-cordate, 1-12 cm. long, short-acuminate, long-petioled; perianth greenish yellow, 1 cm. long; segments ovate, obtuse; achenes 3.5-4.5 mm. long, black, smooth and shining. *Polygonum scandens* L. *Tinaria scandens* (L.) Small. FALSE BUCKWHEAT. Thickets: N.S.—Fla.—La.—Colo.—Mont. *Plain*—*Submont.* JI-O.

FAMILY 38. CHENOPODIACEAE. GOOSEFOOT FAMILY.

More or less fleshy herbs or shrubs, with alternate or opposite leaves, without stipules. Flowers usually clustered in spikes, cymes, or panicles, usually greenish. Calyx of 2-5 sepals. Corolla wanting. Stamens opposite the sepals; anthers introrse. Pistils of 2-5 united carpels; ovary 1-celled; styles 2-5. Fruit a 1-seeded utricle. Embryo curved or spiral.

Embryo annular

Stems and branches not jointed, leaves not scale-like

Flowers perfect, all with perianth, not inclosed in a pair of bracts.

Fruit inclosed in the calyx.

Calyx in fruit not transversely winged.

Sepals 3-5, stamens 1-5

Fruiting calyx herbaceous.

Fruiting calyx fleshy, red.

Sepals 1, stamens 1.

Calyx in fruit transversely winged

Flowers paniculate, leaves ample, sinuate, flat.

Flowers spicate, leaves linear, terete

Fruit laterally flattened, exserted from the marcescent calyx.

Flowers monoecious or dioecious, the pistillate inclosed in two accrescent bractlets.

Pericarp not hairy.

Bracts compressed, leaves more or less farinose; testa mostly coriaceous.

Pistillate flowers without perianth

Pistillate flowers with 2-3 hyaline sepals shorter than the bracts.

Bracts ob-compressed, testa membranous

Pericarp hastate with crested margins, 2-toothed apex; herbs more or

less farinaceous, with toothed leaves

Pericarp obovate or orbicular, entire, undershrubs with entire leaves

Pericarp densely hairy, conic, low and tomentose shrubs

Stems and branches fleshy, jointed, leaves scale-like, flowers sunk into the rachis of the spike.

Flower-clusters decussately opposite; branches opposite.

Flowers spirally arranged, branches alternate.

Embryo spirally coiled.

Shrubs with monoecious bractless flowers, staminate flowers in spikes, without perianth, pistillate ones solitary, axillary, fruiting calyx transversely winged

Herbs with perfect bracteolate flowers.

Fruiting calyx transversely winged, leaves spiny

Fruiting calyx not winged, leaves fleshy, not spiny.

1 CHENOPODIUM.

2 BLITUM.

3. MONOLEPIS.

4 CYCLOLOMA.

5. KOCHIA.

6. CORIOSPERMUM.

7. ATRIPLEX.

8. ENDOLEPIS.

9 SUCKLEYA.

10 GRAYIA.

11 EUROTIA.

12 SALICORNIA.

13. ALLENROLFIA.

14. SARCOPATUS.

15. SALSOLA.

16. DONDIA.

1. CHENOPODIUM (Tourn.) L. GOOSEFOOT, PIGWEED, LAMB'S QUARTER.

Annual (all ours) or perennial herbs, usually with mealy-coated or glandular foliage. Leaves alternate, with entire, toothed or lobed blades. Flowers per-

fect or rarely dioecious, in small axillary or terminal spikes or glomerules. Sepals persistent, flat or keeled. Stamens 1-5; filaments filiform. Ovary usually depressed, 1-celled; styles 2-5; stigmas filiform or subulate. Utricle containing one horizontal or vertical seed. Endosperm mealy.

Leaves more or less mealy or glabrate, never glandular or sweet-scented, sinuately lobed, dentate or entire, embryo forming a complete ring

Stamens 5; calyx not at all fleshy in fruit

Leaves entire or sinuately toothed, but not with large, acute (except in *C. murale*), divaricate teeth, seeds 1-1.5 mm. in diameter

Calyx-lobes carinate; at least the upper panicles exceeding the leaves.

Pericarp easily separating from the seeds

Leaves linear or oblong, entire or slightly sinuately toothed

Whole plant almost perfectly glabrous; glomerules 1-4-flowered, in very lax spikes, leaves narrowly linear. 1. *C. subglabrum*

Leaves more or less mealy beneath, glomerules several-flowered, spikes denser.

Leaves thin, inflorescence not very dense, spikes somewhat interrupted below

Leaves all narrowly linear, 1-nerved, entire 2. *C. leptophyllum*

Lower leaves at least oblong or lanceolate, 3-nerved and often somewhat hastately toothed. 3. *C. pratericola*

Leaves thick; inflorescence dense and crowded; leaves oblong

Plant densely mealy, yellowish 4. *C. desiccatum*

Plant only slightly mealy, dark green 5. *C. aridum*

Leaves broadly ovate or triangular, more or less hastate at the base

Plant densely farinose

Plant low and spreading. 6. *C. incanum*

Plant tall and erect 7. *C. albenscens*

Plant sparingly farinose or glabrate, tall

Leaves very thin, distinctly hastate, inflorescence lax.

Leaves thick, only slightly hastate, rounded at the apex. 8. *C. Fremontii*

Leaves thick, only slightly hastate, rounded at the apex. 9. *C. atrovirens*

Pericarp firmly attached to the seeds.

Leaves subentire or merely hastately toothed

Leaves linear; calyx closed in fruit. 10. *C. inamoensu*

Leaves broader, oblong, lanceolate, ovate or elliptic

Calyx open in fruit, plant ill-scented 11. *C. hians*

Calyx closed in fruit

Leaves thick, more or less farinose, none of them cuspidate

Leaves thin, glabrate; inflorescence lax 12. *C. Watsoni*

Seeds 1 mm. in diameter, upper leaves cuspidate

Seeds about 1.5 mm. in diameter; upper leaves long-acuminate 13. *C. Berlandieri*

Seeds about 1.5 mm. in diameter; upper leaves long-acuminate 14. *C. lanceolatum*

Leaves more or less sinuately dentate, inflorescence dense

Leaves densely mealy. 15. *C. album*

Leaves green or nearly so 16. *C. paganum*

Calyx-lobes not carinate, panicles mostly axillary, shorter than the leaves

Leaves glabrate, seeds horizontal 17. *C. murale*

Leaves farinose and glaucous beneath, seeds vertical 18. *C. salinum*

Leaves with large divaricate acute lobes, seeds about 2 mm. in diameter 19. *C. hybridum*

Stamens 1-2; calyx reddish and slightly fleshy in fruit.

Plant usually more than 1 dm. high, erect; leaves usually more or less toothed

Plant less than 2 dm. high, prostrate, leaves entire or merely hastately toothed 20. *C. rubrum*

Plant less than 2 dm. high, prostrate, leaves entire or merely hastately toothed 21. *C. humile*

Leaves glandular, sweet-scented, pinnately lobed; embryo horseshoe-shaped

Lobes of the leaves rounded or broadly oblong, more or less toothed. 22. *C. Botrys*

Lobes of the leaves lanceolate, entire. 23. *C. incisum*

1. *C. subglabrum* (S. Wats.) A. Nels. Stem 2-4 dm. high, branched, striate, obtusely angled; leaves 1-nerved, 2-10 cm. long, 1-3 mm. (rarely 4 mm.) wide, entire, light green; seeds black, shining, about 1.5 mm. in diameter. Sandy soil: S.D.—Neb.—Utah—Wash.—Ore. *Plain*. Jl—Au.

2. *C. leptophyllum* Nutt. Stem 2-5 dm. high, striately angled; leaves 1-6 dm. long, 1-6 mm. wide, green above, rather densely mealy beneath; sepals strongly carinate, scarcely covering the seed; seeds shining, fully 1 mm. broad. Sandy or dry soil: Man.—Mo.—N.M.—Ariz.—Ore.—B.C.; adv. in the East: Me.—N.J. *Son.*—*Plain*—*Submont.* Je—S.

3. *C. pratericola* Rydb. Stem 3-6 dm. high, striate and angled, nearly glabrous; leaves petioled; blades 2-6 cm. long, 4-18 mm. wide; sepals scarious-

Fruit erect.

Inflorescence of small axillary clusters scattered more or less throughout the plant; all except *P. minimum* with elongated stems or branches, perianth-lobes never keeled near the apex

Plants copiously leafy throughout, upper leaves scarcely reduced and more crowded.

Very slender and low annuals, with red wiry, terete, non-striate stems.

1 *P. minimum*.

Stouter and larger plants, often perennial, with prominently striate stems, usually 3-8 dm long.

Perianth-lobes with yellowish green margins; plant erect, with spreading branches in age, leaves broad, yellowish green. 2. *P. erectum*.

Perianth-lobes with white, pink or purplish margins; plant prostrate or diffusely spreading; leaves from bright to pale bluish green

Leaves thick, prominently veined, oblong, oval, or spatulate, obtuse or rounded at the apex, usually pale; ocreae very conspicuous; faces of the achenes granular 3. *P. buriforme*.

Leaves thin, not prominently veined, bright green; ocreae not conspicuous; faces of the achenes finely striate.

Perianth 2.5-3.5 mm. long, achenes 2.5-3 mm. long, acute; leaves 2-4 cm long. 4. *P. ariculare*

Perianth 2-2.5 mm long; achenes 2-2.5 mm. long, acuminate; leaves mostly less than 2 cm long. 5. *P. neglectum*.

Plants with the upper leaves more scattered and reduced; mostly erect perennials

Upper bracts not subulate, achenes mostly dull

Lobes of the perianth with yellowish margins, perianth 3-4 mm long, achenes about 3 mm. long, nearly smooth 6. *P. ramosissimum*

Lobes of the perianth with whitish or pinkish margins, perianth 2-3 mm long; achenes 2-2.5 mm. long, distinctly granulate or striate

Plant copiously branched and broom-like; leaf-blades linear or nearly so; achenes granulate 7. *P. prolificum*.

Plant sparingly branched, mostly below, leaf-blades oblanceolate to elliptic; achenes finely striate 8. *P. rubescens*.

Upper bracts subulate, achenes smooth and shining 9. *P. savatichense*.

Inflorescence aggregate at the ends of the branches, or more scattered in *P. paronychioides*, in which, however, some of the perianth-lobes are keeled near the apex; bracts leaf-like and usually broader than the narrowly linear leaves; plants dwarf annuals

Perianth-lobes not keeled

Leaves several, gradually merging into the bracts; achenes blunt-angled and strongly striate. 10. *P. Watsonii*.

Leaf usually solitary and much longer than the bracts, achenes sharp-angled and obscurely striate. 11. *P. unifolium*.

Some of the perianth-lobes keeled near the apex.

Bracts herbaceous or the uppermost with a very narrow scarious margin.

Bracts linear; ocreae conspicuous, inflorescence interrupted 12. *P. paronychioides*.

Bracts oblong or narrowly oblong, ocreae inconspicuous, inflorescence contiguous and dense. 13. *P. Kelloggii*

Bracts with broad white petaloid margins. 14. *P. polygaloides*.

Fruit reflexed

Upper bracts much reduced and subulate.

Perianth 1.5-2.5 mm. long; leaves narrowly linear. 15. *P. Engelmannii*.

Perianth 3-5 mm long

Outer perianth-lobes oblong, obtusish, thickened and green or purplish on the back; lower leaves oblanceolate to linear-oblanceolate 16. *P. Douglasii*.

Outer perianth-lobes obovate, rounded at the apex, merely with a narrow midrib; lower leaves linear.

Inflorescence long, lax, virgate; ocreae of the bracts inconspicuous. 17. *P. majus*.

Inflorescence dense, crowded at the ends of the branches, ocreae of the bracts contiguous and conspicuous 18. *P. spergulariforme*.

Upper bracts foliaceous, relatively broad lanceolate or oblong.

Perianth 3.5-4 mm long; lower leaves oblong or nearly so.

Achenes included. 19. *P. montanum*.

Achenes exserted. 20. *P. committum*.

Perianth 2-2.5 mm long; lower leaves obovate, very acute. 21. *P. Austinae*

1. *P. minimum* S. Wats. Annual; stem erect or spreading, 3-20 cm, rarely 30 cm high, branched mostly at the base; leaves obovate, sometimes ovate or elliptic, 0.5-2 cm. long, evenly distributed or crowded above; perianth-segments 1.5-2 mm. long, greenish with rose-colored margins; achenes 2-2.3 mm. long, smooth and shining. *P. Torreyi* S. Wats. Dry or sandy slopes: B.C.—Mont.—Calif. *Submont.* J1-S.

2. *P. erectum* L. Annual; stem usually erect, 2-6 dm. high, yellowish green; leaves oval, elliptic or obovate, 1-6 cm. long; flowers in small axillary

clusters; perianth 3 mm. long; achenes dark brown, granular and dull. Waste places: Mc.—Ga.—Ark.—N.M.—Alta.; (? Ida.) *Plain*. Je-S.

3. *P. buxiforme* Small. Annual or perennial; stem usually prostrate, 3-12 dm. long; leaves oblong, elliptic or oblanceolate, 0.5-2.5 cm. long, usually obtuse, often crisp on the margin; perianth 2-2.5 mm. long; achenes 2-2.5 mm long, dark brown, mostly dull, granular. Sandy or alkaline soil: Ont.—Va.—Tex.—Nev.—B.C. *Plain—Mont*. Je-S.

4. *P. aviculare* L. Annual or sometimes perennial; leaves oblong-lanceolate, acute at both ends, petioled, dull bluish green, rather thin, 1-3 cm. long; flowers pedicelled; perianth 2.5-3.5 mm. long; achenes dark, rugulose-striate, dull. Waste places: Newf.—Va.—Calif.—B.C.; nat. or adv. from Eu. *Plain—Submont*. My-O.

5. *P. neglectum* Besser. Annual or perennial; stems with short internodes, strongly striate, usually minutely roughened; leaves firm, narrowly elliptic-lanceolate, or the upper rarely linear; margins often revolute when dry; perianth 2-2.5 mm. long, venose; segments with usually purplish margins; achenes reddish brown, apiculate-acuminate. *P. aviculare angustissimum* Meisn. Waste places: Me.—Fla.—Ark.—N.M.—Alta.; nat. or adv. from Eu.; more common than *P. aviculare*. *Plain—Submont*. Je-N.

6. *P. ramosissimum* Michx. Annual; stem 2-10 dm. high, somewhat virgate, yellowish green; leaves lanceolate, oblong, or linear-oblong, 1-4 cm. long, yellowish green, the upper ones much reduced in size; perianth about 3 mm. long, achenes 3 mm. long, black, not shining. River valleys and sandy soil: Man.—Ills.—N.M.—Nev.—Wash.—B.C. *Plain—Mont*. Jl-S.

7. *P. prolificum* (Small) B. L. Robins. Annual; stem 3-5 dm. high, much branched, strongly striate, dark green or reddish; leaves linear-oblong or linear, thick, obtuse or acute, strongly veined beneath, dark green, 1-2 cm. long; perianth about 2 mm. long; achenes brown, 2 mm. long, concave on the lanceolate-deltoid faces, shining. (?) *P. flexile* Greene. Sandy places: Me.—Va.—Colo.—Mont. *Plain*. Jl-O.

8. *P. rubescens* Small. Annual or perennial; stem erect, ultimately branched, 1-5 dm. high; leaves thick, narrowly oblong or elliptic, 1-2.5 cm. long, the upper reduced; perianth 3 mm. long; achenes 2-2.5 mm. long, dull. Sandy soil: Sask.—Colo.—Nev.—Ida. *Plain—Submont*. Je-S.

9. *P. sawatchense* Small. Annual; stems erect, striate, obscurely 4-angled, branched from the base, 5-30 cm. high; lower leaves oblanceolate, 1-2 cm. long, acute or obtuse at the apex, often more or less revolute, with a prominent midvein; perianth-segments green, only slightly lighter on the margins, 2 mm. long; achenes rather blunt at both ends, smooth and glossy. Hillsides and mountains. S.D.—N.M.—Calif.—Wash. *Submont.—Mont*. Jl-Au.

10. *P. Watsonii* Small. Annual; stem erect, 5-15 cm. high, sparingly branched, 4-angled, glabrous; leaves linear, 1-5 cm. long; bracts reduced, 0.5-1 cm. long, linear-lanceolate; perianth-segments green, pinkish on the margins, 2 mm. long; achenes nearly black, narrowly ovoid, strongly striate. *P. imbricatum* Nutt., not Raf. *P. confertiflorum* Nutt. Wet places: B.C.—Sask.—N.M.—Calif. *Plain—Mont*. Je-Au.

11. *P. unifolium* Small. Annual, dwarf; stem 1-3 cm. high, simple, or nearly so; well developed leaf mostly solitary, linear, erect, 7-10 mm. long; bracts several, crowded, imbricate, linear or linear-lanceolate; perianth-segments about 1.5 mm. long, white or pinkish, with green ribs; achenes about 1.3 mm long, shining, included. Wet places: Mont.—Colo.—Utah. *Plain—Mont*. Jl-Au.

12. *P. paronychioides* Small. Annual, bushy; stem copiously branched at the base, 8-15 cm. long; leaves linear, 8-10 mm. long; perianths short-pedicelled, solitary or a few together in the axils; segments green, with pale or pink margins, becoming fully 2 mm. long; lobes slightly keeled, acutish; achenes rhombic, about 2 mm. long, granular. Wet places: Mont.—Wyo. *Submont*. Au.

13. *P. Kelloggii* Greene. Annual; stem erect, 3-8 cm. high, branched at the base; leaves linear, acute, 5-10 cm. long, spreading; perianth-segments 1.5-2

mm. long, greenish, with white or cream-colored margins; achenes 1.5 mm. long, rhombic-ovoid, light brown, granular, somewhat striate, dull. In wet soil: Wash.—Mont.—Colo.—Calif. *Submont.*—Mont. JI-S.

14. *P. polygaloides* Meisn. Annual, glabrous; stem slender, erect, 1-2 dm. high, with ascending branches; leaves narrowly linear, 1-3 cm. long, strict; floral leaves oblong or elliptic; perianth-segments 2 mm. long, white or pinkish, with dark midribs; outer segment longer than the inner; achenes about 1.5 mm. long. Wet places: Wash.—Mont.—Wyo.—Ore. *Submont.* Je-Au.

15. *P. Engelmannii* Greene. Annual; stem often diffusely branched at the base, 0.5-3 dm. high; lower leaves linear-oblongate, 0.5-2 cm. long, the upper reduced, bract-like, subulate; perianth-segments oblong, obtuse, with whitish margins; achenes 2-2.5 mm. long, ovoid, black, smooth and shining. *P. tenue microspermum* Engelm. Hillsides and mountains: B.C.—Mont.—Colo. *Plain*—Mont. JI-S.

16. *P. Douglasii* Greene. Annual; stem erect, 2-4 dm. high, with ascending branches; lower leaves oblanceolate, 2-5 cm. long, mostly obtuse or acutish; the upper linear and reduced, scattered; perianth-segments white or rose-colored on the margins; achenes 3-4 mm. long, black, smooth and shining. *P. consimile* Greene. (?) *P. emaciatum* A. Nels. *P. pannosum* S. S. Sharp. Hillsides and in sandy soil. Vt.—N.Y.—N.M.—Calif.—B.C.; probably only introduced east of the Rockies. *Plain*—Mont. Je-Au.

17. *P. majus* (Meisn.) Piper. Annual; stem wiry, terete, 2-4 dm. high, with ascending branches; leaves 2-6 cm. long; bracts linear-subulate, remote; perianth 4-5 mm. long; segments white, with green midrib; achenes black, shining, smooth, 3-3.5 mm. long. *P. coarctatum majus* Meisn. Stony soil: Wash.—Mont.—Wyo.—Ore. *Plain*—*Submont.* Je-S.

18. *P. spargulariaeforme* Meisn. Annual, scurfy throughout; stem erect, 1-3 dm. high, branched from the base; leaves 1-3 cm. long, usually somewhat revolute; bracts rather crowded, subulate; perianth 3.5-4 mm. long, pink; achenes about 3.5 mm. long, black, smooth and shining except the granular apex and angles. *P. coarctatum* Dougl., not Willd. Ridges: B.C.—w Wyo.—Calif. *Plain*—*Submont.* JI-Au.

19. *P. montanum* (Small) Greene. Annual; stem branched from the base, 1-3 dm. high, floriferous from near the base; lower leaves elliptic or oblong-oblanceolate, 1-3 cm. long, 1-nerved; upper leaves smaller, lanceolate or oblong; perianth-segments oblong, dark green or purplish, with white or pinkish margins; achenes black, shining, striate. Mountains: Alta.—N.M.—Calif. *Submont.*—*Subalp.* JI-Au.

20. *P. commixtum* Greene. Annual; stem 0.5-1.5 dm. high, glabrous, branched from the base, glabrous; leaves oval, oblanceolate, or lanceolate, abruptly cuspidate-mucronate, 1-2.5 cm. long, 1-nerved, glabrous; perianth about 3 mm. long, segments elliptic, green, with yellowish white or purplish margins; achenes almost black, shining, smooth and shining. Mountains: Colo.—Mont. *Submont.*—*Subalp.* JI-Au.

21. *P. Austiniae* Greene. Annual; stem mostly erect, 0.5-1 dm. high, branched from the base; leaves ovate-lanceolate to oblanceolate, 0.5-1.5 cm. long, the upper much reduced; perianth green, 2.5 mm. long, drooping; segments narrowly oblong, obtuse, dark green, with white margins; achenes 2.5-3 mm. long, black, smooth and shining. Sandy places: Alta.—Wyo.—Calif. *Submont.* Au-S.

10. PERSICARIA (C. Bauhin) Mill. SMARTWEED, LADY'S THUMB, WATER PEPPER.

Perennial or annual, caulescent herbs, not twining, with alternate leaves and entire leaf-blades, continuous with the ocreae. The latter cylindric, mostly membranous, truncate. Racemes spike-like; pedicels articulate below the calyx. Calyx more or less colored, white or greenish, glandular-punctate; perianth-segments mostly 5. Stamens 4-8, filaments not dilated. Ovary 1-celled, 1-ovuled;

styles mostly 2, sometimes 3, usually partially united; stigmas capitate. Achenes mostly lenticular, sometimes 3-angular, usually black, smooth or granular. Endosperm horny; cotyledons accumbent.

Racemes terminal only and usually solitary; plants aquatic perennials

Ocreae without spreading foliaceous tops.

Plant usually floating, or decumbent and rooting; leaves of an oblong type, glabrous, acute or obtuse.

Plant usually diffuse and emersed, leaves of a lanceolate type, pubescent, acuminate.

Ocreae with spreading foliaceous tops: leaf-blades narrowly oblong or lanceolate (broader in floating forms), pubescent.

Racemes axillary as well as terminal, numerous, annuals

Ocreae without marginal bristles

Racemes erect; glands on the branches and inflorescence numerous, stalked

Racemes drooping; glands on the branches and inflorescence sessile

Styles united only at the base

Styles united to about the middle

Leaves deep green on both sides

Leaves pale beneath.

Ocreae bristle-fringed.

Racemes oblong or cylindric, about 1 cm. thick in fruit; perianth not punctate, usually pink to red-purple.

Racemes slender, loosely flowered, about 5 mm. thick in fruit, perianth white or pale green, copiously punctate.

Racemes erect; achenes smooth and shining.

Racemes nodding at least in fruit; achenes granular and dull.

1. *P. coccinea*

2. *P. Muhlenbergii*

3. *P. Hartwrightii*

4. *P. omisa*

5. *P. incarnata*

6. *P. lapathifolia*

7. *P. incana*

8. *P. Persicaria*

9. *P. punctata*

10. *P. Hydrospiper*

1. *P. coccinea* (Muhl.) Greene. Perennial, glabrous, or the young shoots somewhat pubescent; stem 5-50 dm. long; leaves oblong or elliptic, 3-10 cm. long, glossy, obtuse or acute at both ends, or when growing in mud more elongate, elliptic-lanceolate and acute; raceme spike-like, 1-3 cm. long; perianth light rose-colored; achenes lenticular, black. *Polygonum amphibium* Hook., not L. *Persicaria platensis*, *P. subcoracea*, *P. psychrophila*, *P. oregana*, and *P. laetenrens* Greene. In water or rarely in mud: Me.—N.J.—N.M.—Calif.—Alaska. Plain—Mont. Je—Au.

2. *P. Muhlenbergii* (Meisn.) Small. Perennial, more or less strigose-hispid throughout; stem erect or creeping at the base, 3-8 dm. high, simple; leaf-blades broadly lanceolate, 5-20 cm. long, acuminate or acute; racemes spike-like, linear or linear-oblong, 3-10 cm. long; perianth dark rose-colored, rarely pink, 4 mm. long; achenes lenticular, black, granular but shining. *Polygonum Muhlenbergii* (Meisn.) S. Wats. *P. emersum* (Michx.) Britton. *Persicaria emersa* (Michx.) Small. *P. propinqua* and *P. Wardii* Greene. In swamps and shallow water: Me.—Va.—N.M.—Calif.—B.C.; Mex. Plain—Submont. Je—S.

3. *P. Hartwrightii* (A. Gray) Greene. Perennial, more or less hispid throughout; stem ascending or suberect, 3-7 dm. long, or rarely floating in water; leaf-blades narrowly lanceolate or oblong-lanceolate or oblong, 6-18 cm. long, raceme spike-like, oblong or ovoid, 1-3 cm. long, erect; perianth rose-colored, 3-4.5 cm. long; achenes lenticular, 2.5 mm. long, black, smooth and shining. *Polygonum Hartwrightii* A. Gray. *Persicaria muriculata* and *P. villosula* Greene. Wet places and shallow water. Me.—Pa.—Calif.—Wash.—Sask. Plain—Submont. Je—S.

4. *P. omisa* Greene. Annual; stem 3-6 dm. high, with copious stipitate glands; ocreae short, cup-shaped; leaf-blades 5-10 cm. long, lanceolate or oblong-lanceolate, glabrous, punctate; racemes short-oblong or ellipsoid, 1-2 cm. long; perianth deep pink, about 4 mm. long; achenes round-ovate, black and shining, nearly flat on one side. *Polygonum omisum* Greene. Wet ground and dried-up ponds: Kans.—Colo. Plain. Jl—S.

5. *P. incarnata* (Ell.) Small. Annual, nearly glabrous throughout; stem erect, 6-10 dm. long, more or less thickened at the nodes; leaf-blades lanceolate or linear-lanceolate, 5-20 cm. long, acuminate or acute; racemes linear, 3-8 cm. long, drooping; perianth whitish, green, or rose-colored, 2-3 mm. long; achenes lenticular, rarely 3-angled, dark brown or black, shining, smooth. *Polygonum incarnatum* Ell. Wet places: Vt.—Fla.—Calif.—Ida. Plain—Submont. Jl—O

6. *P. lapathifolia* (L.) S. F. Gray. Annual, glabrous or nearly so; stem erect, 3-6 dm. high, thickened at the nodes; leaf-blades broadly or narrowly lanceolate, 5-20 cm. long, attenuate, punctate and ciliate on the margins; racemes linear-oblong, 2-8 cm. long, drooping, dense; perianth flesh-colored or whitish, 2-2.5 mm. long; achenes lenticular or rarely 3-angled, black or dark brown, slightly granular, shining. *Polygonum lapathifolium* L. Wet places: Que.—Fla.—Calif.—B.C.; Mex., W. Ind.; Eurasia. Plain—Submont. JI-O.

7. *P. incana* (Schmidt) S. F. Gray. Annual; stem erect, 1-4 dm. high, slightly scurfy; leaf-blades lanceolate or oblong, acute or obtuse; racemes oblong, 1-3 cm. long, erect or only slightly nodding; peduncles with sessile glands; perianth 2-2.5 mm. long, greenish or pinkish white; achenes lenticular, dark brown, shining. *Polygonum incanum* Schmidt. Wet places and swamps. Newf.—N.Y.—Colo.—B.C.; Eu. Plain—Submont. Je-S.

8. *P. Persicaria* (L.) Small. Annual, glabrous or puberulent; stem erect, 2-8 dm. high, usually branched; leaf-blades lanceolate or linear-lanceolate, 2-18 cm. long, acuminate, conspicuously punctate, usually with a lunar or triangular spot in the middle; racemes oblong or ovoid, 1-3 cm. long, 0.5-1 cm. thick, mostly erect; perianth about 2.5 mm. long, pink or purple; achenes lenticular or 3-angled, smooth and shining. *Polygonum Persicaria* L. LADY'S THUMB. Waste places and rich soil: Newf.—Fla.—Calif.—B.C.; Mex.; Eu. Plain—Submont. My-S.

9. *P. punctata* (Ell.) Small. Annual or perennial, mostly glabrous throughout, stem erect, or creeping at the base, 3-10 dm. high, more or less branched; leaf-blades lanceolate to linear-lanceolate, 5-15 cm. long, acuminate, conspicuously punctate; raceme linear, erect, 1-6 cm. long, somewhat interrupted below; perianth greenish, about 2 mm. long, conspicuously glandular-punctate; achenes lenticular or 3-angled, black, smooth and shining. *Polygonum punctatum* Ell. *P. acre* H.B.K., not Lam. SMARTWEED. Swamps and wet places: Me.—Fla.—Calif.—Wash.; Mex., C. Am., W. Ind., and S. Am. Plain. Mr-D.

10. *P. Hydropiper* (L.) Opiz. Annual, glabrous; stem erect or assurgent, 2-6 dm. high, simple or branched, sometimes reddish; leaf-blades ovate-lanceolate or lanceolate, 1.5-9 cm. long, acute, more or less papillose, punctate; racemes linear, 2-6 cm. long, interrupted and drooping; perianth greenish, 2.5-3 mm. long, glandular; achenes lenticular or 3-angled, dark brown, strongly granular and dull. *Polygonum Hydropiper* L. WATER PEPPER. Wet places: Newf.—Ga.—Calif.—B.C.; Mex. and C. Am.; nat. from Eu. Plain. Je-S.

11. BISTORTA (C. Bauhin) Mill. BISTORT.

Perennials, with thickened horizontal rootstocks and simple stems. Basal leaves long-petioled; stem-leaves short-petioled or sessile, narrow, entire. Ocreae cylindric, hyaline, never ciliate, oblique at the summit. Inflorescence a solitary spike-like raceme, sometimes bearing bulblets at the base. Pedicels articulate at the base of the perianth. Perianth 5-parted, not glandular-punctate. Stamens 8, exserted. Style usually 3-parted; achenes triangular or rarely lenticular. Endosperm horny; cotyledons accumbent.

Racemes not viviparous, not bulblet-bearing, oblong, 1-2 cm. thick

Perianth 5-6 mm. long, leaf-blades lanceolate, oblong, or oblanceolate

Perianth 3-4 mm. long, basal leaf-blades linear.

Racemes viviparous, bulblet-bearing below, linear, 5-8 mm. thick.

1. *B. bistortoides*.

2. *B. linearifolia*.

3. *B. rictipara*.

1. *B. bistortoides* (Pursh) Small. Stem erect, 2-7 dm. high, simple; blades of the basal leaves 10-25 cm. long, 0.5-3 cm. broad, acute or obtuse, glabrous on both sides or scabrous-puberulent beneath; stem-leaves lanceolate, sessile; raceme oblong, 1-6 cm. long, 1-1.5 cm. thick, densely flowered; perianth light rose-colored to white; achenes light brown, smooth and shining. *Polygonum bistortoides* Pursh. *B. calophylla*, *B. glastifolia*, and *B. lilacina* Greene. Wet meadows and swamps: Mont.—N.M.—Calif.—B.C. Alp.—Mont. Je-S.

2. *B. linearifolia* (S. Wats.) Greene. Stem slender, 1-3 dm. high; basal leaf-blades 3-4 cm. long, acute; cauline leaves linear-lanceolate to linear, sessile;

raceme ovoid, less than 2 cm. long; perianth mostly white; achenes smooth and shining. *Polygonum Bistorta linearifolium* S. Wats. *B. jejuna* Greene. Alpine swamps: Mont.—Colo.—Utah—Nev. Alp.—Mont. Je—Au.

3. *B. vivipara* (L.) S. F. Gray. Blades of the basal leaves oblong or lanceolate, 2–10 cm. long, 1–2.5 cm. wide; stem-leaves lanceolate to linear; raceme narrowly cylindric, 2–10 cm. long, 0.5–1 cm. thick; perianth pale rose-colored or white; achenes dark brown, granular and dull. *Polygonum viviparum* L. *B. scopulina* Greene. Alpine, arctic, and subarctic swamps: Greenl.—N.H.—N.M.—Alaska; Eurasia. Alp.—Mont. Je—Au.

12. FAGOPYRUM (Tourn.) Mill. BUCKWHEAT.

Caulescent glabrous annuals. Leaves alternate, petioled; blades hastate or cordate; ocreae oblique, entire. Flowers perfect, several in corymbiform cymes, with slender pedicels subtended by an ocreola. Calyx corioid; sepals 5, equal. Stamens 8. Styles 3; stigmas capitate. Achenes 3-angled, margined or crested. Embryo S-shaped, central.

1. *F. Fagopyrum* (L.) Karst. Stem 1–9 dm. high, branched, pubescent at the nodes; leaf-blades hastate, 2.5–8 cm. long; ocreae fugacious; perianth whitish; achenes ovoid, 5 mm. long, with pinnately striate faces, acute-angled. *F. esculentum* Moench. Escaped from cultivation; native of Eurasia.

13. ACONOGONUM Reichenb.

Caulescent herbaceous or rarely suffrutescent plants, with horizontal rootstocks. Leaves fleshy or thin. Inflorescence of axillary and terminal racemes or panicles. Ocreae funnelform, oblique. Pedicels articulate below the perianth. Perianth 5-parted, not glandular-punctate. Stamens 5–8, included. Style 3-parted; achenes 3-angled, smooth. Endosperm horny; cotyledons accumbent.

1. *A. phytolaccaefolium* (Meisn.) Small. Perennial; stem erect, 1–2 m. high, channeled, branched; leaf-blades lanceolate, 5–15 cm. long, 1–4 cm. wide, acute or acuminate at both ends, slightly crisped, ciliate on the margins; inflorescence paniculate, leafy; perianth greenish or whitish, 3 mm. long; segments obovate or oblong, rounded; achenes 4 mm. long, broadly ovoid or oval, light chestnut-colored, shining. *Polygonum polymorphum* and *P. alpinum* Am. auth. Subalpine and alpine regions: Alaska—Ida.—Nev.—Calif.; Asia. Submont. Jl—S.

14. TRACAULON Raf. TEAR-THUMB.

Annual or rarely perennial, prickly-armed herbs, with weak 4-angled stems. Leaves alternate; blades hastate or cordate, membranous, the petioles and veins prickly. Ocreae oblique. Flowers in terminal or axillary spikes, or capitate clusters. Sepals 4 or 5, somewhat colored, neither keeled nor winged. Stamens 5–8; filaments not dilated. Ovary 1-celled; styles 2 or 3, partially united. Achenes lenticular or 3-angled, smooth and shining. Endosperm horny; cotyledons accumbent.

1. *T. sagittatum* (L.) Small. Annual; stem slender, decumbent or reclining, 3–15 dm. high, branched, 4-angled, armed on the angles with sharp recurved prickles; leaves lanceolate or oblong, sagittate at the base, 1–12 cm. long, 0.5–3 cm. broad, the lower petioled, the uppermost sessile; perianth white, green, or red, 4 mm. long, 5-parted; achenes 3-angled, black or brownish. *Polygonum sagittatum* L. Wet meadows: Newf.—Fla.—Tex.—Sask. Plain. Jl—S.

15. BILDERDYKIA Dum. FALSE BUCKWHEAT, BINDWEED.

Annual or perennial twining herbaceous vines. Leaves alternate, with cordate or hastate blades. Ocreae oblique, naked or fringed. Racemes loosely flowered, terminal or axillary, often paniculate. Sepals 5, green, white, or yellowish, the outer two sepals and the intermediate one keeled or winged. Pedicels slender, reflexed and articulate. Stamens 8; filaments short, converging. Ovary 1-celled; styles 3, short or almost wanting; stigmas capitate. Achenes

3-angled, dark brown or black. Endosperm horny. Cotyledons accumbent. [*Tiniaria* Reichenb.]

Outer sepals merely keeled at maturity.
Outer sepals developing conspicuous wings.

1. *B. Convolvulus*.
2. *B. scandens*.

1. *B. Convolvulus* (L.) Dum. Annual, glabrous but scurfy, pale green, stem ascending and twining, 1-12 dm. long; leaf-blades ovate-sagittate or deltoid, 2-6 cm. long, acuminate at the apex; racemes 1-6 cm. long; perianth green, 3.5-4 mm. long; segments oblong, obtuse; achenes 3-angled, 3.5 mm. long, black, granular. *Polygonum Convolvulus* L. *Tiniaria Convolvulus* Webb. & Moq. BINDWEED. Among bushes: N.S.—Fla.—Calif.—B.C.; nat. from Eu. Plain—Mont. My—S.

2. *B. scandens* (L.) Greene. Perennial, glabrous, somewhat scurfy; stem extensively twining, 5-30 dm. high; leaf-blades ovate-cordate to oblong-cordate, 1-12 cm. long, short-acuminate, long-petioled, perianth greenish yellow, 1 cm. long; segments ovate, obtuse; achenes 3.5-4.5 mm. long, black, smooth and shining. *Polygonum scandens* L. *Tiniaria scandens* (L.) Small. FALSE BUCKWHEAT. Thickets: N.S.—Fla.—La.—Colo.—Mont. Plain—Submont. Jl—O.

FAMILY 38. CHENOPODIACEAE. GOOSEFOOT FAMILY.

More or less fleshy herbs or shrubs, with alternate or opposite leaves, without stipules. Flowers usually clustered in spikes, cymes, or panicles, usually greenish. Calyx of 2-5 sepals. Corolla wanting. Stamens opposite the sepals; anthers introrse. Pistils of 2-5 united carpels; ovary 1-celled; styles 2-5. Fruit a 1-seeded utricle. Embryo curved or spiral.

Embryo annular

Stems and branches not jointed, leaves not scale-like

Flowers perfect, all with perianth, not inclosed in a pair of bracts.

Fruit inclosed in the calyx.

Calyx in fruit not transversely winged.

Sepals 3-5, stamens 1-5

Fruiting calyx herbaceous.

Fruiting calyx fleshy, red.

Sepals 1, stamens 1.

Calyx in fruit transversely winged

Flowers paniculate; leaves ample, sinuate, flat.

Flowers spicate; leaves linear, terete.

Fruit laterally flattened, exserted from the marcescent calyx.

Flowers monoecious or dioecious; the pistillate inclosed in two accrescent bractlets.

Pericarp not hairy.

Bracts compressed; leaves more or less farinose; testa mostly coriaceous.

Pistillate flowers without perianth.

Pistillate flowers with 2-3 hyaline sepals shorter than the bracts.

Bracts ob-compressed, testa membranous.

Pericarp hastate with crested margins, 2-toothed apex; herbs more or less farinaceous, with toothed leaves

Pericarp obovate or orbicular, entire, undershrubs with entire leaves.

Pericarp densely hairy, conic, low and tomentose shrubs.

Stems and branches fleshy, jointed; leaves scale-like; flowers sunk into the rachis of the spike.

Flower-clusters decussately opposite, branches opposite.

Flowers spirally arranged, branches alternate.

Embryo spirally coiled.

Shrubs with monoecious bracteolate flowers, staminate flowers in spikes, without perianth, pistillate ones solitary, axillary, fruiting calyx transversely winged.

Herbs with perfect bracteolate flowers

Fruiting calyx transversely winged; leaves spiny.

Fruiting calyx not winged, leaves fleshy, not spiny.

1. CHENOPODIUM.

2. BLITUM.

3. MONOLEPIS.

4. CYCLOLOMA.

5. KOCHIA.

6. CORIOSPERMUM.

7. ATRIPLEX.

8. ENDOLEPIS.

9. SUCKLEYA.

10. GRAYIA.

11. EUROTIA.

12. SALICORNIA.

13. ALLENROLFIA.

14. SARCOCATUS.

15. SALSOLA.

16. DONDIA.

1. CHENOPODIUM (Tourn.) L. GOOSEFOOT, PIGWEED, LAMB'S QUARTER.

Annual (all ours) or perennial herbs, usually with mealy-coated or glandular foliage. Leaves alternate, with entire, toothed or lobed blades. Flowers per-

feet or rarely dioecious, in small axillary or terminal spikes or glomerules. Sepals persistent, flat or keeled. Stamens 1-5; filaments filiform. Ovary usually depressed, 1-celled; styles 2-5; stigmas filiform or subulate. Utricle containing one horizontal or vertical seed. Endosperm mealy.

Leaves more or less mealy or glabrate, never glandular or sweet-scented, sinuately lobed, dentate or entire, embryo forming a complete ring.

Stamens 5; calyx not at all fleshy in fruit

Leaves entire or sinuately toothed, but not with large, acute (except in *C. murale*), divaricate teeth, seeds 1-1.5 mm. in diameter.

Calyx-lobes carinate; at least the upper panicles exceeding the leaves

Pericarp easily separating from the seeds

Leaves linear or oblong, entire or slightly sinuately toothed

Whole plant almost perfectly glabrous; glomerules 1-4-flowered, in very lax spikes, leaves narrowly linear. 1 *C. subglabrum*

Leaves more or less mealy beneath; glomerules several-flowered, spikes denser

Leaves thin, inflorescence not very dense; spikes somewhat interrupted below

Leaves all narrowly linear, 1-nerved, entire 2. *C. leptophyllum*

Lower leaves at least oblong or lanceolate, 3-nerved and often somewhat hastately toothed. 3 *C. pratericola*

Leaves thick; inflorescence dense and crowded, leaves oblong

Plant densely mealy, yellowish 4 *C. desiccatum*

Plant only slightly mealy, dark green 5 *C. aridum*

Leaves broadly ovate or triangular, more or less hastate at the base

Plant densely farinose

Plant low and spreading. 6 *C. incanum*

Plant tall and erect. 7. *C. albescent*

Plant sparingly farinose or glabrate, tall

Leaves very thin, distinctly hastate, inflorescence lax

Leaves thick, only slightly hastate, rounded at the apex. 8 *C. Fremontii*

9. *C. atrovirens*

Pericarp firmly attached to the seeds

Leaves subentire or merely hastately toothed

Leaves linear; calyx closed in fruit

Leaves broader, oblong, lanceolate, ovate or elliptic. 10 *C. inamoenum*

Calyx open in fruit, plant ill-scented. 11. *C. hians*

Calyx closed in fruit.

Leaves thick, more or less farinose, none of them cuspidate

Leaves thin, glabrate; inflorescence lax 12 *C. Watsoni*

Seeds 1 mm. in diameter; upper leaves cuspidate.

Seeds about 1.5 mm. in diameter; upper leaves long-acuminate 13 *C. Berlandieri*

14 *C. lanceolatum*

Leaves more or less sinuately dentate; inflorescence dense

Leaves densely mealy 15. *C. album*

Leaves green or nearly so. 16 *C. pagatum*

Calyx-lobes not carinate; panicles mostly axillary, shorter than the leaves

Leaves glabrate, seeds horizontal. 17. *C. murale*

Leaves farinose and glaucous beneath; seeds vertical 18 *C. salinum*

Leaves with large divaricate acute lobes, seeds about 2 mm. in diameter

19 *C. hybridum*

Stamens 1-2, calyx reddish and slightly fleshy in fruit

Plant usually more than 1 dm. high, erect, leaves usually more or less toothed

Plant less than 2 dm. high, prostrate; leaves entire or merely hastately toothed

Leaves glandular, sweet-scented, pinnately lobed, embryo horseshoe-shaped

Lobes of the leaves rounded or broadly oblong, more or less toothed. 20 *C. rubrum*

Lobes of the leaves lanceolate, entire 21. *C. humile*

22 *C. Botrys*

23. *C. incisum*

1. *C. subglabrum* (S. Wats.) A. Nels. Stem 2-4 dm. high, branched, striate, obtusely angled; leaves 1-nerved, 2-10 cm. long, 1-3 mm. (rarely 4 mm.) wide, entire, light green; seeds black, shining, about 1.5 mm. in diameter. Sandy soil: S.D.—Neb.—Utah—Wash.—Ore. Plain. Jl—Au.

2. *C. leptophyllum* Nutt. Stem 2-5 dm. high, striately angled; leaves 1-6 dm. long, 1-6 mm. wide, green above, rather densely mealy beneath; sepals strongly carinate, scarcely covering the seed; seeds shining, fully 1 mm. broad. Sandy or dry soil: Man.—Mo.—N.M.—Ariz.—Ore.—B.C.; adv. in the East: Me.—N.J. Son.—Plain—Submont. Je—S.

3. *C. pratericola* Rydb. Stem 3-6 dm. high, striate and angled, nearly glabrous; leaves petioled; blades 2-6 cm. long, 4-18 mm. wide; sepals scarious-

marginated, green on the back, slightly carinate; seeds black, shining, about 1.5 mm in diameter. Sandy soil, fields and waste grounds: Neb.—Mo.—N.M.—Ariz.—Wash.; n Mex. *Plain*. JI-S.

4. *C. desiccatum* A. Nels. Stem 2-5 dm. high; leaves short-petioled; blades obtuse or acutish, 1-4 cm. long, 4-10 mm. wide, thick, mealy on both sides, sepals slightly carinate; seeds black, shining, 1.5 mm. broad. *C. oblongifolium* (S. Wats.) Rydb. *C. desiccatum* was described from a depauperate form. Arid ground: N.D.—Mo.—Tex.—Calif.—Wash. *Plain*—*Submont.* JI-S.

5. *C. aridum* A. Nels. Stem erect, 3-4 dm. high; leaves moderately thick, dark green; blades 1-3 cm. long, oblong to ovate-lanceolate, entire or rarely slightly hastately toothed, obtuse, seeds scarcely 1 mm. in diameter, black, shining. *C. Wolfii* Rydb. Arid ground: Colo.—Wyo. *Submont.*—*Mont* JI-Au.

6. *C. incanum* (S. Wats.) Heller. Stem divaricately branched, 1-3 dm. high, mealy, obtusely angled; leaf-blades rhombic or broadly ovate, hastately lobed, 3-ribbed, 1-2 cm. long and nearly as broad; flowers in dense clusters; sepals very mealy, slightly carinate; seeds black, shining. Dry ground, especially in "prairie-dog towns": Neb.—Kans.—N.M.—Ariz.—Utah. *Plain*—*Son.* My-Au.

7. *C. albescens* Small. Stem erect, 5-12 dm. high, mealy when young, angled, leaf-blades 2-4 cm. long, sharply acute or bristle-tipped, hastately lobed or toothed, 3-ribbed; inflorescence rather lax; sepals mealy, barely keeled; seed 1-1.5 mm. broad, black, shining. Dry soil: Tex.—N.M.—Colo. *Son.*—*Submont.* Je-JI

8. *C. Fremontii* S. Wats. Stem 2-8 dm. high, with slender branches, green; leaf-blades broadly triangular or rhombic, sinuate-dentate, 1-5 cm. long and nearly as wide, rounded and mucronate at the apex; sepals strongly carinate, nearly covering the fruit; seed black, shining, fully 1 mm. broad. In cañons and among bushes: Sask.—N.M.—Ariz.—Nev.—B.C.; n Mex. *Plain*—*Mont.* JI S.

9. *C. atrovirens* Rydb. Stem 3-5 dm. high, striate and obtusely angled; leaf-blades broadly ovate, the upper mucronate at the apex, 3-ribbed, 1-3 cm. long, 5-15 mm. wide; flowers in short dense spikes, sparingly mealy; seeds black, shining, 1 mm. broad. Foot-hills: Mont.—Wyo.—Nev. *Submont.* JI-Au.

10. *C. inamoenus* Standl. Stem erect, 1-8 dm. high, much branched; petioles very short; leaf-blades 1-3 cm. long, 1-5 mm. wide, obtuse, 1-nerved, thick, densely farinose, becoming glabrate above; flowers in large glomerules in dense erect paniculate spikes; sepals ovate, slightly carinate; seeds 0.8 mm. broad, black, shining. Dry places: Wyo.—N.M.—Nev.—Ore.; n Mex. Au-S.

11. *C. hians* Standl. Stem 4-8 dm. high, copiously mealy; petioles half as long as the leaf-blade or shorter; blade 1.2-3 cm. long, rounded and short-apiculate at the apex, green above, densely white-mealy beneath; flowers in large glomerules in paniculate spikes; sepals rounded-oblong or ovate, obtuse, obtusely carinate, mealy; seeds black, 1 mm. broad, shining. Dry hillsides: N.M.—Wyo. Au

12. *C. Watsoni* A. Nels. Stem stout, 2-6 dm. high; leaf-blades 1-2 cm. long, oval, ovate, or oblong, obtuse, dark green and sparingly mealy; inflorescence narrow, dense; seed 1.25-1.5 mm. in diameter. *C. olidum* S. Wats. Dry places: Mont.—N.M.—Ariz. *Son.*—*Mont* Au-O.

13. *C. Berlandieri* Moq. Stem erect, 3-9 dm. high, much branched; leaf-blades lanceolate, oblong, or ovate, sometimes somewhat rhombic, 1.5-4 cm. long, inflorescence open, interrupted, lax; sepals barely keeled; seeds black, punctate. Dry soil: N.C.—Fla.—Tex.—Colo.; n Mex. *Plain*—*Mont.* JI-S.

14. *C. lanceolatum* Muhl. Stem 4-12 dm. high, branched, blunt-angled; lower leaf-blades ovate or lanceolate, coarsely toothed, those of the inflorescence linear-lanceolate, entire; inflorescence open and interrupted; sepals merely keeled; seeds black, shining. *C. viride* Auth., not L. Waste places and fields: Mass.—Fla.—La.—Sask.; B.C. *Plain.* JI-S.

15. *C. album* L. Stem erect, 6–30 dm. high; leaf-blades ovate or lanceolate, more or less rhombic, 2–8 cm. long, acute or obtuse, usually hastately lobed, inflorescence dense; sepals with light margins, enclosing the fruit; seed black, shining. Fields, waste places, and thickets: Newf.—Fla.—Calif.—B.C.—Yukon; Eurasia. *Plain—Submont.* JI-S.

16. *C. paganum* Reichenb. Stem erect, 0.5–3 m. high; leaf-blades ovate to broadly lanceolate, 3–15 cm. long, coarsely sinuate-dentate, acute at the apex, thin; inflorescence dense, much-branched, sepals sharply carinate, enclosing the fruit; seeds black, rugulose-pitted. Waste places: Mass.—Va.—N.M.—Colo., adv. from Eu. *Plain—Submont.* JI-S.

17. *C. murale* L. Stem erect or decumbent, 1–6 dm. long, widely branching; leaf-blades thin, rhombic-ovate, 2–8 cm. long, acute, coarsely sinuate-dentate, cuneate or truncate at the base; flower-clusters small, shorter than the leaves, sepals oblong, obtuse; seeds firmly adherent to the pericarp, sharp-angled. Waste places: Me.—Fla.—Calif.—B.C.; Mex. and W. Ind.; adv. or nat. from Eu. *Plain—Submont.* Mr-O.

18. *C. salinum* Standl. Stem prostrate, decumbent or ascending, freely branched, more or less fleshy; leaf-blades broadly lanceolate to triangular-ovate or oblong, acute, 2–3 cm. long, sinuately toothed and somewhat hastate; flowers in small axillary spikes shorter than the leaves; sepals obovate, rounded at the apex; seeds finely tuberculate. *C. glaucum* Am. auth., mainly. Alkaline soils: Alta.—Neb.—Colo.—Utah—Ore. *Plain—Submont.* JI-S.

19. *C. hybridum* L. Stem erect, 6–13 dm. high; leaf-blades rhombic-ovate or triangular-ovate, long-acuminate, sharply sinuate-dentate, with 1–4 large teeth on each side, or the uppermost entire, 1–2 dm. long; flowers in large open panicles; sepals oblong, slightly keeled; seeds firmly attached to the pericarp, acute-margined, punctate. Woods, thickets and waste places: Que.—Vt.—N.Y.—Ky.—N.M.—Calif.—B.C.; nat. from Eu. *Plain—Submont.*

20. *C. rubrum* L. Stem erect, branched, 3–8 dm. high; leaf-blades thick, triangular-hastate to lanceolate, 3–10 cm. long, coarsely sinuate-dentate or the upper entire, nearly glabrous, dark green; flower-clusters densely spicate on short branches; sepals 2–5, obtuse, rather fleshy; seeds easily separating from the pericarp, less than 1 mm. in diameter. *C. succosum* A. Nels. COAST BLITE. Alkaline or saline soil: Newf.—N.J.—Mo.—N.M.—Ariz.—B.C.; Eu. *Plain—Submont.* JI-S.

21. *C. humile* Hook. Stem decumbent or spreading, divaricately branched, leaf-blades obovate, spatulate, or lanceolate, the upper linear, 1–3 cm. long, fleshy, glabrous or nearly so; flower-clusters in small axillary spikes; sepals oblong, obtuse, somewhat fleshy; seeds less than 1 mm. broad, easily separating from the pericarp. ALKALI BLITE. Alkaline meadows: Sask.—Neb.—Colo.—Calif.—B.C. *Plain—Submont.* Je-N.

22. *C. Botrys* L. Stem erect, 1–6 dm. high, branched; leaf-blades 1–5 cm. long, oblong or ovate, irregularly pinnatifid; flower-clusters in small, axillary cymes, seeds horizontal or vertical, 0.8 mm. broad, adherent to the pericarp. JERUSALEM OAK. Waste places: N.S.—Ga.—Tex.—Calif.—B.C.; Mex.; nat. from Eu. *Plain—Mont.* JI-O.

23. *C. incisum* Poir. Stem 2–5 dm. high, branched; leaves lanceolate or ovate in outline, 2–4 cm. long, sinuate-pinnatifid or sinuate-dentate, with entire lobes or teeth; flowers in axillary cymes; sepals acute, carinate; seeds about 0.5 mm. broad, obtusely margined. *C. cornutum* (Torr.) B. & H. Dry places: Colo.—N.M.—Ariz.; Mex. *Son.—Submont.* Je-S.

2. BLITUM L. STRAWBERRY BLITE, STRAWBERRY PIGWEED.

Annual fleshy herbs, with light green, glabrous, toothed leaves. Flowers small, green or reddish, aggregate in small axillary, head-like clusters, or the upper clusters forming an interrupted spike. Calyx 2–5-lobed, becoming fleshy and bright red in fruit. Stamens 1–5, mostly 2. Ovary 1-celled; styles 2–5,

stigmas slender. Seed vertical, shining, separating from the pericarp. Endosperm mealy.

Leaves more or less dentate, truncate or broadly cuneate at the base; inflorescence dense; glomerules 5-10 mm. in diameter

Inflorescence naked above, seeds with acute margins 1. *B. capitatum*.
Inflorescence leafy throughout, seeds round-margined. 2. *B. virgatum*.
Leaves entire, except the hastate teeth at the cuneate base, inflorescence slender and naked above, glomerules 3-6 mm. in diameter 3. *B. hastatum*.

1. *B. capitatum* L. Stem simple or branched from the base, 3-6 dm. high; leaves broadly triangular to lanceolate, 3-7 cm. long; the uppermost entire, rather thick; flowers in rather large clusters in the axils of the upper leaves and in a terminal spike; sepals acute or acutish. In rocky soil: N.S.—N.J.—N.M.—Calif.—Alaska; Eurasia. *Submont.*—*Mont.* My—Au.

2. *B. virgatum* L. Stem branched throughout, 1.5-8 dm. high; leaf-blades triangular to rhombic-oblong, 2-9 cm. long, coarsely lacinate-dentate, the upper smaller and sharply hastate; glomerules large, all axillary; sepals rounded. Waste places: Ore.—Ida.—Wash.; Mass.—N.Y.; adventive from the Old World.

3. *B. hastatum* Rydb. Stem slender, 2-4 dm. high; leaves very thin; blades 3-7 cm. long, ovate or ovate-lanceolate in outline, the upper ones smaller, not hastate; flowers in the upper axils and in a slender interrupted terminal spike. Stony ground: Wyo.—Colo.—Nev. *Submont.*—*Mont.* Jl—S.

3. *MONÓLEPIS* Schrad. POVERTY WEED.

Low branching annuals, with alternate leaves. Flowers small, perfect or polygamous, in small axillary clusters, without bracts. Calyx of a single persistent sepal. Stamen 1. Ovary 1-celled; styles 2; stigmas filiform. Seed vertical, flattened. Endosperm copious, mealy.

Leaves lanceolate, hastately lobed, flower-clusters several-flowered, pericarp somewhat fleshy.

Leaves spatulate to linear-spatulate, entire, pericarp thin.

Flower-clusters 10-20-flowered, pericarp easily separating from the seed.

Flower-clusters 1-3-flowered, pericarp adherent to the seed. 2. *M. spathulata*.
3. *M. pusilla*.

1. *M. Nuttalliana* (Schultes) Engelm. Annual; stem decumbent or ascending, divaricately branched, 1-3 dm. high; leaves short-petioled or sessile; blades thick, 2-7 cm. long, acute at both ends, sparingly sinuate-dentate or entire; sepal fleshy and foliaceous, oblanceolate or spatulate; pericarp adherent to the seed. *M. chenopodioides* Moq. Saline soils: Man.—Minn.—Tex.—N.M.—Calif.—Wash.; Sonora; Siberia. *Plain*—*Mont.* Mr—S.

2. *M. spathulata* A. Gray. Stem decumbent or ascending, branched at the base, 7-15 cm. long; leaves short-petioled, 1-2 cm. long; blades spatulate, thick, acute, entire; sepal spatulate, obtuse; seed 0.5 mm. broad. Saline soil: Calif.—Ida.—Ore. *Son.*

3. *M. pusilla* Torr. Stem erect, dichotomously branched, 5-15 cm. high, somewhat mealy, glabrate; leaves sessile, oblong-spatulate, obtuse, 5-15 mm. long, entire; seeds less than 0.5 mm. broad. Alkaline valleys and sandy plains: Wyo.—Colo.—Calif.—Wash. *Son.*—*Submont.* My—Jl.

4. *CYCLOLÒMA* Moq. WINGED PIGWEED, TUMBLEWEED.

Diffusely branched coarse annuals, with alternate toothed leaves. Flowers polygamous, i. e., perfect and pistillate, in paniculate spikes, without bracts. Sepals 5, keeled, each at maturity with a horizontal wing. Stamens 5. Ovary 1-celled, hairy; styles 2 or 3, partially united. Utricle depressed, enclosed in the calyx. Seed flat, horizontal. Endosperm mealy.

1. *C. atriplicifolium* (Spreng.) Coult. Stem erect, divaricately branched, 3-6 dm. high; leaves short-petioled or sessile; blades lanceolate or ovate, coarsely sinuately dentate, acute at the apex, cuneate at the base, 2-7 cm. long; wing of the calyx irregularly lobed and toothed, 4-5 mm. in diameter, covering the

utricule. *C. platyphyllum* (Miehx.) Moq. Sandy soil: Ont.—Ark.—Tex.—N.M.—Ariz.—Mont. *L. Son.—Plain—Submont.* Je-S.

5. KÔCHIA Roth.

Perennial or annual herbs, or undershrubs, with alternate narrow leaves. Flowers solitary or few together in the upper axils, perfect or pistillate, sometimes bracteolate. Calyx herbaceous, 5-cleft, persistent, at length developing a horizontal wing. Stamens 3-5, usually exserted; filaments linear. Ovary ovoid, narrowed upwards; stigmas 2. Pericarp not adherent to the inverted seed. Endosperm scanty.

Perennial undershrubs; leaves linear-filiform, fleshy

Branches tomentulose, soon glabrate, leaves somewhat hairy when young, fruit nearly glabrous 1 *K. americana*

Branches and leaves densely and permanently hairy, fruit very pubescent 2 *K. vestita*

Annual; leaves lanceolate, not fleshy 3 *K. scoparia*

1. *K. americana* S. Wats. Low undershrub; stems 1-4 dm. high; leaves 6-25 mm. long, acute, ascending, puberulent or glabrate; ovary ovate, tomentose at the apex, shorter than the calyx and styles. Foot-hills and alkaline flats Wyo.—Colo.—N.M.—Calif. *Plain—Submont.* Je-S

2. *K. vestita* S. Wats. Low undershrub; stems 1-4 dm. high; leaves 6-20 mm. long, villous, nearly erect, acute; ovary oblong, nearly equalling the calyx. Foot-hills and alkaline flats: Wyo.—Colo.—Calif.—Ore. *Plain—Submont.* My-Jl

3. *K. scoparia* (L.) Sehrad. Branches annual; stems sparingly pubescent or glabrous, 3-10 dm. high; branches strongly ascending; leaves lanceolate, or the upper linear, the lower 3-nerved, entire; flowering branches and calyces villous. Waste places and fields: Vt.—Pa.—Colo.; adv. from the Old World *Plain.* Jl-S.

6. CORISPERMUM (A. Juss.) L. BUG-SEED.

Caulescent annuals, with narrow sessile leaves and diffusely branched stems. Flowers solitary, in the axils of more or less leaf-like bracts. Sepals 1-3, unequal, scarious. Stamens 1-3, rarely 5, hypogynous, one longer than the rest; filaments dilated. Ovary 1-celled; styles 2. Utricle more or less flattened, in ours acutely margined or winged. Pericarp adherent to the vertical seed. Endosperm fleshy.

Fruit with a distinct wing, about 0.5 mm. wide

Spike lax, lower bracts much narrower than the fruit 1 *C. nitidum*

Spikes dense, lower bracts usually overtopping, and rarely narrower than the fruit. 2 *C. marginale*

Fruit merely acute-margined, scarcely at all winged.

Plant glabrous 3 *C. emarginatum*

Plant more or less villous. 4 *C. villosum*

1. *C. nitidum* Kit. Stem branched, 3-6 dm. high, glabrous; leaves linear-filiform, 2-5 cm. long, 1 mm. wide or less; lower bracts subulate, about 1 cm. long, 1-1.5 mm. broad at the base; the upper lanceolate, shorter; fruit about 2 mm. broad and 3 mm. long. *C. hyssopifolium macrocarpum* S. Wats. On sand-hills and in cañons: Ill.—Tex.—N.M.—N.D.; Eurasia. *Son.—Plain—Submont.* Jl-S.

2. *C. marginale* Rydb. Stem glabrous, much branched, 2-5 dm. high, leaves narrowly linear, 2-5 cm. long, 1.5-2 mm. wide; lower bracts lanceolate, about 1 cm. long, the upper ovate, 5 mm. long, all with conspicuous scarious margins; fruit about 4 mm. long and 2.5 mm. wide. *C. imbricatum* A. Nels. Sandy soil: Wyo.—N.M. *Plain—Submont.* Au-O

3. *C. emarginatum* Rydb. Stem branched near the base, 3-4 dm. high; leaves narrowly linear, 2-4 cm. long, 1-2 mm. wide, cuspidate-pointed; bracts except the lowest ovate, 5-7 mm. long, acuminate, scarious-margined; fruit 2.5-3 mm. long and about 2 mm. wide. Sandy valleys: Alta.—Colo.—Nev. *Submont.*

4. *C. villosum* Rydb. Stem 2-4 dm. high, diffusely branched from near the base; leaves linear, 2-4 cm. long, 1-3 mm. wide, cuspidate-mucronate; spikes rather dense; bracts more or less imbricate, the lower linear-lanceolate, 5-10 mm. long, the upper ovate, acuminate, 4-5 mm. long, with broad scarious margins; fruit 2.5-3 mm. long, 2 mm. wide. Sandy valleys and fields: Sask — N M.—Ariz.—Ore.—Wash. *Plain—Submont.* JI-S.

7. **ATRIPLEX** (Tourne.) L. ORACHE, SALT-BUSH, SHAD-SCALES.

Annual or perennial herbs or low shrubs, with scaly or scurfy, often silvery pubescence. Leaves alternate or some opposite. Flowers monoecious or dioecious, in axillary or terminal panicles, or congested axillary spikes. Staminate flowers without bracts; sepals 3-5; stamens 3-5; filaments distinct or united; anthers 2-celled, opening lengthwise. Pistillate flowers subtended by 2, more or less united bracts, which are entire or toothed, often crested, tuberculate, or winged on the back. Calyx wanting. Ovary 1-celled; stigmas 2, subulate or filiform. Utricle wholly or partly enclosed in the accrescent bracts. Seeds erect or nearly horizontal. Endosperm mealy.

Annuals

- Bracts united only at the base, radicle inferior.
 - Bracts thin, rounded-ovate, mucronate 1 *A. hortensis*
 - Bracts thick, deltoid or lanceolate, acute
 - Leaves not hastate 2 *A. lapathifolia.*
 - Leaves more or less hastate 3. *A. hastata.*
- Bracts united to about the middle, radicle superior
 - Bracts lanceolate or lance-oblong, not tubercled on the back; often lacinate below 4 *A. phyllostegia.*
 - Bracts broader; if narrow, broadest above the middle
 - Bracts broadly cuneate, truncate at the apex, seldom with tubercles
 - Leaves triangular or cordate-ovate
 - Plant low, decumbent, 1 dm. high or less, leaves less than 2 cm. long 5. *A. subdecumbens.*
 - Plant larger, 3-10 dm. high, leaves 1.5-2.5 cm. long
 - Bracts subentire, corky at the apex, fruit short-peduncled, leaves cordate-ovate 6 *A. saccaria*
 - Bracts bluntly 3-toothed at the herbaceous apex, fruit subsessile; leaves more triangular-ovate 7. *A. truncata.*
 - Leaves linear. 8 *A. Wolffii.*
 - Bracts rhombic-orbicular to triangular, conspicuously toothed on the margins and usually appendaged or tubercled on the back
 - Bracts with linear, subulate, or oblong appendages on the back.
 - Staminate flowers few, mixed with the pistillate ones 9. *A. Caput-Medusae.*
 - Staminate flowers in terminal clusters 6. *A. saccaria.*
 - Bracts with triangular lobes and appendages
 - Leaves thin, more or less toothed or hastate
 - Bracts ovate, acute, longer than broad, branches terete or nearly so. 10. *A. rosea.*
 - Bracts suborbicular, as broad as long, branches distinctly round-angled
 - Leaves subsessile, only the lowest with short-winged petioles, very thin, usually cuspidate-acuminate, staminate spikes, if present, elongated. 11. *A. expansa.*
 - Leaves petioled, firmer, acute, staminate spikes, if present, very short. 12. *A. argentea.*
 - Leaves ovate or oblong, entire, usually less than 2 cm. long.
 - Leaves more or less 3-ribbed, branches ascending
 - Leaves strongly ribbed, faces of the bracts with short thick appendages 13 *A. Powellii.*
 - Leaves obscurely ribbed, bracts without dorsal appendages. 14. *A. Rydbergii.*
 - Leaves 1-ribbed; branches spreading, slender
 - Leaves ovate or oblong, 2-7 mm. long, bracts ovate, tubercled below the middle. 15. *A. tenuissima*
 - Leaves linear, 7-17 mm. long; bracts ovate-oblong, tubercled at or above the middle. 16. *A. Greenei.*

Perennials

- Bracts not winged on the back.
 - Plant monoecious, lateral wings decurrent on the pedicels. 17. *A. graciliflora.*
 - Plant dioecious, lateral wings not decurrent
 - Bracts with entire or merely wavy (rarely slightly denticulate) margins, without appendages on the back.
 - Bracts small, 3-4 mm. long, longitudinally veined.
 - Bracts united to above the middle; shrub not spinescent 18. *A. lentiformis.*

- Bracts nearly free; shrub spinescent 19 *A. Torreyi*.
 Bracts larger, 5-10 mm. long, not veined.
 Leaves reniform, coarsely sinuately dentate; free portion of the bracts reniform 20. *A. hymenolytra*
 Leaves entire; bracts not reniform.
 Leaves broadly oval or obovate; bracts obovate or suborbicular
 Bracts entire. 21 *A. confertifolia*
 Bracts dentate or denticulate, at least near the base 22. *A. collina*
 Leaves oblanceolate; bracts lance-oblong. 23 *A. subconferta*
 Bracts with a distinctly toothed margin or appendaged on the back
 Bracts broadest above the middle
 Bracts more or less toothed on the margin, only rarely tuberculate on the back
 Bracts 3-toothed at the apex, the middle tooth the longest
 Bracts oblong-cuneate, leaves oblanceolate-cuneate 24 *A. Gardneri*
 Bracts broadly obovate-cuneate; leaves linear 25 *A. tridentata*
 Bracts several-toothed at the apex 26 *A. pabularis*
 Bracts entire, spongy, strongly tubercled or appendaged on the back 27 *A. corrugata*
 Bracts broadest below the middle, strongly tuberculate or appendaged
 Leaves oblanceolate to spatulate
 Leaves oblanceolate, oblong, or narrowly spatulate, subsessile, or short-petioled
 Plant low, staminate flowers brown, in panicles, leaves short-petioled 28 *A. oblanceolata*
 Plant usually tall, staminate flowers yellow, in interrupted spikes; leaves sessile
 Bracts ovate, sessile or nearly so; leaf-blades oblanceolate to oblong 29 *A. Nuttallii*
 Bracts fusiform, stalked, leaf-blades oblong-linear to linear 30 *A. falcata*
 Leaves broadly spatulate, conspicuously petioled; staminate flowers brown, in interrupted spikes. 31. *A. cuneata*
 Leaves oval, sessile. 32. *A. burxifolia*
 Bracts broadly 4-winged 33. *A. Garrettii*
 Leaves oval, abruptly acuminate
 Leaves from oblong or spatulate to linear, not acuminate 34. *A. aptera*.
 Wings thick, lacinate-toothed
 Wings thin, sinuately dentate or subentire
 Wings when fully developed 4-6 mm. wide, distinctly dentate.
 Leaves comparatively broad, linear-oblong to spatulate, 4-10 mm. wide, sinus at the apex of the fruit narrow; free portion of the bract one-half to three-fourths as long as the width of the wing 35. *A. canescens*
 Leaves very narrow, linear, 2-5 mm. wide; sinus of the strongly reticulate bract broad; free portion of the bract less than half as long as the width of the wing 36. *A. tetraptera*
 Wing very broad and thin, fully 8 mm. wide, merely sinuate, leaves linear 37. *A. occidentalis*.

1. *A. hortensis* L. Stem 1-1.5 m. high; leaves petioled; lower leaf-blades from cordate or hastate to ovate, sinuately toothed, 1-2 dm. long, the upper lanceolate and entire; bracts rounded-ovate, about 1 cm. in diameter, thin, reticulate. Waste places: N.Y.—Colo.—Utah—Mont.; escaped from cultivation; native of Eu. *Plain*—*Submont.* Jl—Au.

2. *A. laspathifolia* Rydb. Stem strict, 4-6 dm. high; leaves petioled; blades somewhat fleshy, dark green, lanceolate, 3-6 cm. long, entire; bracts in fruit about 4 mm. long and 5 mm. wide, often slightly hastate, sometimes with 1 or 2 tubercles on the back, thin, veiny, acute. Alkaline flats: Mont.—Wyo.—Neb. *Plain.* Au—S.

3. *A. hastata* L. Stem branched, 5-10 dm. high, subglabrous; leaf-blades fleshy, rarely sinuately-toothed, 3-7 cm. long; flowers numerous, in large fleshy clusters forming interrupted spikes; fruiting bracts triangular-ovate, about 5 mm. long and broad, usually with 1 or 2 small teeth on each margin, and sometimes with 1 or 2 fleshy tubercles on the back. *A. carnosa* A. Nels. *A. subspicata* Rydb., a low spreading form. Alkaline meadows or flats: Alta.—Kans.—N.M.—Nev.—Ida. *Plain*—*Son.* Au—S.

4. *A. phyllostegia* (Torr.) S. Wats. Stem stout, 2-6 dm. high, simple or branched; leaves thin, rhombic-triangular, hastate, or ovate, 2-5 cm. long, entire; flower-clusters axillary and in short naked spikes at the ends; bracts

nearly free, linear-lanceolate, becoming 8–12 mm. long, strongly 3-nerved, somewhat hastately lobed. *Obione phyllostegia* Torr. *Endolepis phyllostegia* Rydb., in part. *A. Draconis* M. E. Jones. Valleys and foot-hills: Utah—Nev. *Son.*—*Submont.* My—Jl.

5. *A. subdecumbens* M. E. Jones. Stem 5–20 cm. long, much branched at the base, mealy throughout; leaves barely petioled; blades ovate to lanceolate, 12–18 mm. long, entire, thin; flower-clusters small, axillary; fruiting bracts about 2 mm. long, obscurely dentate on the margin. Gravelly meadows: Utah. *Mont.* Au

6. *A. saccaria* S. Wats. Stem ascending, 1–1.5 dm. high, diffusely branched, densely scurfy; leaves short-petioled or sessile; blades 1–2 cm. long; flower-clusters axillary; fruiting bracts about 3 mm. long, cuneate, reticulate on the sides. *A. cornuta* M. E. Jones. Arid regions: Nev.—Wyo.—N.M.—Ariz. *Son.*

7. *A. truncata* (Torr.) A. Gray. Stem stout, 3–10 dm. high, sparingly branched; leaves sessile or the lower short-petioled; blades broadly triangular-ovate, 2–4 cm. long, truncate or subcordate at the base; inflorescence leafy; bracts 3 mm. long; faces not reticulate and rarely tubercled. *A. Nelsonii* M. E. Jones. Alkaline flats: Mont.—N.M.—Calif.—B.C. *Plain*—*Submont.* Jl—S.

8. *A. Wolfii* S. Wats. Stem 1–2 dm. high, slender, branching from the base, scurfy; leaves sessile, linear, 1–1.5 cm. long, acute, scurfy; flowers in small axillary clusters (monoecious); fruiting bracts 1–1.5 mm. long, cuneate-obovate; summit foliaceous, 3-toothed. Alkaline flats: Wyo.—Colo.—Utah. *Plain*—*Submont.* Je—S.

9. *A. Caput-Medusae* Eastw. Stem with several, erect branches from the base, 4–5 dm. high, much branched; leaves petioled; blades vertical, thin, deltoid or hastate; fruiting bracts orbicular, becoming hard, 4–5 mm. long, thickly beset with flat horny acuminate processes. River banks: se Utah—sw Colo.—N.M. *Son.*

10. *A. rosea* L. Stem erect, freely branching, often 1 m. high; leaf-blades ovate, 2–5 cm. long, coarsely and irregularly toothed; flowers in axillary clusters, staminate and pistillate mixed; fruiting bracts about 5 mm. long, hastately toothed near the base, the faces with slender green appendages. *A. spatiosa* A. Nels. Alkaline flats and railroad embankments: Wyo.—Kans.—Chihuahua—Calif.—Wash.; N.Y.—Fla.; adv. from the Old World. *Plain*—*Son.* Au—S.

11. *A. expansa* S. Wats. Stem divaricately branched, 3–18 dm. high; leaves thin, triangular-hastate; pistillate flowers in axillary clusters; fruiting bracts coarsely toothed on the margins and somewhat tuberculate on the faces. Alkaline soil: Tex.—(? Colo.)—Calif.; n Mex. *Son.* Jl—O.

12. *A. argentea* Nutt. Stem divaricately branched, angled, 2–10 dm. high; leaf-blades ovate, triangular-ovate, or subrhombic, 2–5 cm. long; pistillate flowers in axillary clusters; fruiting bracts suborbicular, usually deeply toothed and with projections on the faces. *A. rotundata* A. Nels. SALT-BUSH. Alkaline flats: Sask.—N.D.—Colo.—B.C. *Plain*—*Son.* Jl—S.

13. *A. Powellii* S. Wats. Stems 2–5 dm. high, freely branched; leaves silvery white, petioled; leaf-blades 0.8–2 cm. long; flowers in small clusters in the axils, the staminate and pistillate usually mixed or the staminate ones above; fruiting bracts suborbicular, about 5 mm. broad, irregularly toothed; the faces with short thick appendages. *A. philonitra* A. Nels. Alkaline flats and dry lakes: Alta.—S.D.—N.M.—Ariz.—Mont. *Son.*—*Submont.* Jl—S.

14. *A. Rydbergii* Standl. Stem erect, branched, 2–4 dm. high, subterete; leaves petioled or the upper subsessile; blades ovate or rhombic-ovate to elliptic, 1.5–3.5 cm. long, obtuse or acute at the apex, cuneate at the base, entire, grayish; pistillate flowers solitary or in small clusters in the axils, sometimes mixed with staminate ones, the staminate ones mostly in interrupted terminal spikes; fruiting bracts flabelliform, deeply and coarsely dentate on the margins. Dry roadsides and hills: se Utah. *Son.* Jl.

15. *A. tenuissima* A. Nels. Stem branched from the base, 2-3 dm. high; branches slender, decumbent; flower-clusters small, axillary; fruiting bracts very small, less than 2 mm. long, triangular-ovate, with thick appendages on the faces. Arid ground: Utah. *Submont.* S.

16. *A. Greenei* A. Nels. Stem 1.5-4 dm. high, much branched; branches strongly ascending, finely furfuraceous; flowers in small axillary clusters, fruiting bracts ovate-oblong or oblong, 2 mm. long, minutely tuberculate, 3-nerved. Arid ground: Wyo. *Submont.*

17. *A. gracilliflora* M. E. Jones. Annual (?) or perennial; stem diffusely branched, 3-6 dm. long, round, sparingly mealy, leaves petioled; blades cordate-ovate, 1-2 cm. long, entire, fleshy; pistillate flowers in small axillary clusters, the staminate ones in terminal panicles; fruiting bracts orbicular, entire, about 1 cm. broad. Alkaline soil: Utah. *Son.* Jl.

18. *A. lentiformis* (Torr.) S. Wats. Shrubby perennial; stems diffusely branched, 6-35 dm. high; leaves short-petioled; blades ovate or oblong-rhombic, 1-3.5 cm. long, entire, cuneate at the base; flowers paniculate; fruiting bracts orbicular, obscurely crenate, 4-5 mm. broad. Alkaline flats: Ariz.—s Utah—Calif.; n Mex. *L. Son.* S-F.

19. *A. Torreyi* S. Wats. Shrubby perennial; stem diffusely branched, 6-15 dm. high; leaves short-petioled; blades ovate or oblong-triangular, often subhastate, 1-3 cm. long, bluish gray; flowers densely paniculate; fruiting bracts orbicular or reniform, obscurely denticulate, 3-4 mm. broad. Desert valleys Nev.—s Utah—Ariz.—Calif. *L. Son.* Jl-S.

20. *A. hymenolytra* (Torr.) S. Wats. Shrubby perennial; stem 6-10 dm. high; leaves petioled; blades 2-3 cm. long; flowers usually in small panicles, but also in axillary clusters; fruiting bracts reniform, entire, about 1 cm. broad. Alkaline plains: N.M.—Utah—Calif. *Son.* D-Ap.

21. *A. confertifolia* (Torr.) S. Wats. Shrubby dioecious perennial; stem 3-15 dm. high; branches terete, spinescent; leaf-blades ovate or obovate to orbicular, 0.5-2 cm. long, short-petioled; flowers in axillary clusters; fruiting bracts broadly ovate or suborbicular, about 1 cm. broad. SHAD-SCALES. Alkaline valleys and bluffs: N.D.—N.M.—Calif.—Ore. *Son.*—*Plain*—*Submont.* My-Au.

22. *A. collina* Woot. & Standl. Shrubby dioecious perennial; stem 2-3 dm. high, much branched; branches spinose; leaf-blades oval-oblong to obovate, 1-2.5 cm. long; flower in axillary clusters, forming densely leafy spikes; fruiting bracts ovate-orbicular, 5-8 mm. long, acute or acutish. Dry hillsides: Colo.—N.M.—Ariz.—Utah. *Son.*

23. *A. subconferta* Rydb. A low dioecious shrub, with ascending, rather slender, spinescent branches; leaf-blades oblanceolate, acutish or obtuse, 1-2 cm. long, short-petioled, entire; flowers in axillary clusters; fruiting bracts lance-oblong, usually acute, 5-8 mm. long, entire. Dry bench-lands: Ida. *Submont.* Jl.

24. *A. Gardneri* (Moq.) Standl. Suffrutescent perennial; stems decumbent at the base, 2-4 dm. high; leaves sessile or nearly so; blades 3-6 mm. wide, 1.5-3 cm. long; flowers in axillary capitate clusters or the staminate more paniculate above; fruiting bracts 5-6 mm. long; faces smooth and reticulate; staminate flowers brown. *A. Gordonii* Hook. *A. fruticulosa* and *A. eremicola* Osterh. Alkaline flats or dry lake beds: Wyo.—Colo. *Plann.* My-Jl.

25. *A. tridentata* O. Kuntze. Suffrutescent dioecious perennial; stem with erect branches, 3-8 dm. high; leaves sessile, linear, 3-6 cm. long, 2-5 mm. wide, entire; flowers in axillary clusters. Saline soil: Utah—Wyo.—Colo. *Son.*

26. *A. pabularis* A. Nels. Suffrutescent perennial; stem with erect branches, 2-5 dm. high; leaves sessile or nearly so; blades oblong to almost linear, 1-5 cm. long; flowers in leafy panicles; fruiting bracts cuneate-obovate, usually 5-toothed at the apex; faces smooth. Alkaline flats: Wyo. Jl-S.

27. *A. corrugata* S. Wats. Suffrutescent perennial; stem much branched, 2-3 dm. high; leaf-blades linear-oblanccolate to oblong, entire, 6-18 mm. long;

pistillate flowers in axillary clusters, the staminate ones in short crowded terminal spikes; fruiting bracts about 4 mm. long. Alkaline valleys: Colo. *Son.* My-Au.

28. *A. oblanceolata* Rydb. Suffrutescent perennial, with decumbent base and ascending branches, about 2 dm. high; leaves 2-3 cm. long, obtuse or acutish; pistillate flowers in small axillary clusters; fruiting bracts ovate in outline, slightly dentate, tubercled or irregularly crested on the back. Alkaline or clayey flats: Mont.—Colo. *Plain.* Jl-Au.

29. *A. Nuttallii* S. Wats. Suffrutescent or shrubby perennial; stems 3-6 dm. high, branching near the base; leaves 2-5 cm. long; pistillate flowers in axillary clusters; fruiting bracts ovate or orbicular, 3-4 mm. long, irregularly toothed, muricate or tooth-crested on the faces. Plains, bad-lands, and arid valleys: Sask.—Neb.—Colo.—Nev.—Ida. *Plain—Submont.* Je-S.

30. *A. falcata* (M. E. Jones) Standl. Suffrutescent perennial; stem 2-5 dm. high, with ascending branches; leaves 1.5-5 cm. long, 2-7 mm. wide; flower-clusters both axillary and in terminal spikes; fruiting bracts 5-8 mm. long, entire-margined or sparsely dentate at the apex, united to near the tip, often muricate or tuberculate below. *A. Nuttallii falcata* and *A. Nuttallii anomala* M. E. Jones. Plains and hillsides: Wash.—Ida.—Utah—Nev. *Son.*

31. *A. cuneata* A. Nels. Suffrutescent perennial; stem branched near the base, decumbent; leaves numerous, petioled; leaf-blades 1-3 cm. long; pistillate flowers in axillary clusters; fruiting bracts ovate or suborbicular, irregularly toothed and with thick flattened processes on the faces. Arid plains: sw Colo.—Utah—N.M.—Ariz. *Submont.* Je-Jl.

32. *A. buxifolia* Rydb. Suffrutescent perennial; stem branched near the base, with simple branches, 3-4 dm. high; leaves thick, 1-2 cm. long; pistillate flowers in axillary clusters; fruiting bracts ovate, acute, 4-5 mm. long, toothed on the margins and with thick, often flattened processes on the faces. Dry plains: Wyo. *Submont.* Au.

33. *A. Garrettii* Rydb. A low shrub, with straw-colored branches; leaves short-petioled, oval, grayish on both sides; flowers in axillary and terminal clusters, bracts 8 mm. long and as broad, 4-winged, coarsely toothed, sometimes with processes on the back; free portion 1-2 mm. long. Hills: se Utah. *Son.* Jl.

34. *A. aptera* A. Nels. A shrubby perennial; stems with shining, white, more or less flaky bark, 1-4 dm. high; leaves narrowly oblanceolate to oblong, acute or obtuse, 2-4 cm. long, entire; pistillate flowers axillary; fruiting bracts 3-4 mm. broad, reticulate and ribbed. *A. odontoptera* Rydb. Saline flats: Alta.—Colo. *Plain—Submont.* Jl-Au.

35. *A. canescens* (Pursh) Nutt. Shrubby perennial; leaves 2-5 cm. long; pistillate flowers axillary, short-pedicelled, the staminate clusters in subterminal spikes, fruiting bracts orbicular in outline, when fully developed 12-15 mm. broad. Dry mesas and alkaline valleys: S.D.—Kans.—N.M.—Calif.—Ore. *Plain—Submont.* Je-Au.

36. *A. tetraptera* (Benth.) Rydb. Shrubby perennial; stem 6-10 dm. high, white, branched; leaves 2-4 cm. long; pistillate flowers axillary, the staminate clusters forming subterminal spikes; fruiting bracts about 1 cm. broad, strongly reticulate. Desert regions: s Utah—Ariz.—s Calif.—Nev. *L. Son.* Ap-Jl.

37. *A. occidentalis* (Torr.) D. Dietr. Shrubby perennial; stem 5-20 dm. high, divaricately branched and somewhat spinose; leaves 2-4 cm. long, 2-5 mm. wide, linear or oblanceolate, obtuse or even retuse; pistillate flowers axillary, the staminate clusters forming terminal panicles; fruiting bracts 16-18 mm. broad. Arid plains: Tex.—Colo.—Utah—Ariz.; n Mex. *Son.* My-Jl.

8. *ENDÓLEPIS* Torr.

Monoecious or dioecious annual herbs. Staminate flowers ebracteate in glomerate terminal spikes; calyx gamosepalous, urceolate, 5-lobed, each lobe

with a gibbosity at its base. Stamens 5; filaments subulate. Pistillate flowers solitary or clustered in the axils of the leaves, 2-bracted; bracts ovate, membranous, united, forming a sack enclosing the flower, or nearly free. Calyx of 2-3 distinct sepals. Utricle ovate, compressed. Radicle superior.

Leaves thin, lanceolate, 1-nerved.

1. *E. Suckleyi*.

Leaves thick, ovate, or ovate-lanceolate; the lower 3-nerved.

2. *E. dioica*.

1. ***E. Suckleyi*** Torr. Low annual; stem erect, with ascending branches, 1-3 dm. high, almost glabrous; leaves sessile, 2-3 cm. long, entire; staminate clusters both axillary and forming short terminal spikes; fruiting bracts ovate, 2 mm. long, membranous, pubescent. *Atriplex Endolepis* S. Wats. *A. Suckleyana* Rydb. Plains: Sask.—Mont.—S.D. Plain. Jl.

2. ***E. dioica*** (Nutt.) Standl. Low annual, usually less than 1 dm. high, rarely 2-3 dm.; stem branched; leaves usually less than 1 cm. long; staminate flowers in small clusters in the axils of the upper leaves or at the end of the branches. *Kochia dioica* Nutt. *E. ovata* Rydb. Plains: Mont.—Wyo. Plain. Je-S.

9. SUCKLEYA A. Gray.

Monococious fleshy annuals. Flowers axillary, the staminate above. Calyx 3-4-parted to the base. Stamens 3 or 4, distinct; anther 2-celled. Fruiting bracts subhastate, obcompressed, herbaceously cristate on the margins, 2-cleft at the apex. Radicle superior.

1. ***S. Suckleyana*** (Torr.) Rydb. Prostrate or ascending annual; stem diffusely branched, 1-4 dm. long, sparingly scurfy; leaves petioled; blades orbicular to rhombic-ovate, 1-3 cm. broad, acutely sinuate-dentate; fruiting bracts 5-6 mm. long, ovate-rhombic and subhastate, with crenate ridges. *Obione Suckleyana* Torr. *Suckleya petolaris* A. Gray. Along streams: Mont.—Colo. Plain—Submont. Jl-Au.

10. GRAYIA H. & A. HOP SAGE.

Subspinescent or unarmed undershrubs or shrubs, with alternate leaves, dioecious or monoecious. Flowers small, in axillary clusters and terminal spikes. Staminate flowers bractless; calyx 4-parted; stamens 4 or 5; filaments short, subulate. Bracts of the pistillate flowers obcompressed, membranous, united into a sack with a narrow opening at the apex; calyx nonc. Ovary 1-celled, styles 2. Seeds vertical; embryo annular; radicle inferior. [*Eremosium* Greene.]

Plant spiny; leaves 1-3 cm. long, spatulate; bracts 8-12 mm. wide

1. *G. spinosa*

Plant not spiny; leaves 2.5-5 cm. long, linear-oblancoolate, bracts 4-6 mm. wide

2. *G. Brandegei*

1. ***G. spinosa*** (Hook.) Moq. Erect diffusely branched shrub, 3-10 dm. high; leaf-blades fleshy, glabrous or at first somewhat mealy, 1-3 cm. long, obtuse or acute; fruiting bracts smooth, emarginate, white or pink. *G. polygaloides* H. & A. Alkaline plains or hills: Mont.—Wyo.—Utah—Calif.—Wash. Son.—Submont. Ap-Je.

2. ***G. Brandegei*** A. Gray. Unarmed shrub, with erect branches, 3-5 dm. high; leaves sessile or short-petioled, 4-6 mm. wide, scurfy; fruiting bracts scarcely emarginate, scurfy. Arid hills, among rocks: w Colo.—se Utah. Son. Jl.

11. EUROTIA Adans. WHITE SAGE, WINTER SAGE, WINTER FAT.

Low pubescent undershrubs, with alternate, entire leaves, either polygamomonoecious or dioecious. Flowers in small axillary clusters. Staminate flowers bractless; calyx 4-parted; stamens 4; filaments slender. Pistillate flowers bibracteate; bracts sessile, somewhat obcompressed, united to the apex, not winged, 2-horned, densely long-hairy on the sides. Ovary hairy, oblong-ovate, membranous; stigmas 2, elongate. Seeds vertical, obovate; radicle inferior.

Branches erect, not spinescent; monoecious or some plants only pistillate; pubescence of mixed stellate and simple hairs

1. *E. lanata*

Branches ascending or spreading, becoming more or less spinescent; dioecious; pubescence of stellate hairs only.

2. *E. subspinosa*

1. *E. lanata* (Pursh) Moq. Undershrub, white or later rufous-tomentose, 2-10 dm. high; leaves linear, with revolute margins, 2-4 cm. long, 2-5 mm. wide; staminate flower-clusters above the pistillate ones, in some individuals much more numerous, in others few or none; fruiting bracts 4-6 mm. long, lanceolate; horns about 1 mm. long. Plains and hills: Sask.—Tex.—Calif.—Wash. Son.—Plain—Mont. Je-S.

2. *E. subspinosa* Rydb. Dioecious shrub, 6-10 dm. high; leaves linear or oblong, obtuse, entire, 1-3 cm. long; flower-clusters of the staminate plant crowded and forming simple, leafy spikes; fruiting bracts lanceolate, about 6 mm. long; horns usually about 2 mm. long. Rocky hills in desert regions: s Utah—Ariz.—Calif.; Sonora. Son. Ap-S.

12. SALICORNIA (Tourn.) L. GLASSWORT, SAMPHIRE.

Annual or perennial, fleshy, glabrous herbs, with scale-like leaves; branches and leaves opposite; internodes very short. Flowers perfect or polygamous, in cylindric spikes, sunk in cavities of the internodes, 3-7 together. Calyx fleshy, with a truncate or 3-4-toothed border. Stamens 2, rarely 1; filaments filiform or subulate. Utricle oblong or ovoid, included in the spongy perianth. Seeds erect; endosperm wanting; embryo conduplicate.

Annual with a taproot.

Perennial with a creeping rootstock.

1. *S. rubra*.

2. *S. utahensis*.

1. *S. rubra* A. Nels. Stem erect, divaricately branched throughout, 1-2 dm. high; scale-like leaves short, broadly triangular, wider than long; fruiting spikes 2-4 cm. long; internodes very short, scarcely exceeding the middle flower of the nodes below. Border of alkaline lakes: Sask.—Kans.—Colo.—Nev.—B.C. Plain. Au-S.

2. *S. utahensis* Tidest. Stems 1-2 dm. high, with short branches; scale-like leaves connate, broadly triangular, about 3 mm. long, scarious-margined; internodes 1-2 cm. long or the lower shorter, 3-4 mm. thick; spikes on short lateral branches, 8-15 mm. long, 4-5 mm. thick; bracts broader than long. Alkaline and saline soil: Utah. Son. Je.

13. ALLENROLFIA Kuntze. BURRO WEED.

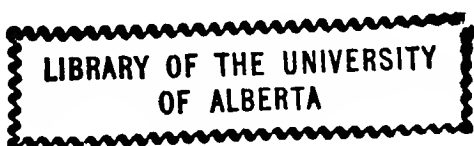
Fleshy, jointed shrubs, with alternate branches and scale-like leaves. Flowers perfect, arranged spirally in crowded spikes. Calyx of 4 or 5 concave, carinate, imbricate sepals, more or less united. Stamens 1-2; filaments slender, exserted. Ovary oblong; styles 2 or 3, distinct. Fruit with a membranous pericarp, free from the seed. Albumen copious; radicle inferior, basal. [*Spirostachys* S. Wats., not Sond.]

1. *A. occidentalis* (S. Wats.) Kuntze. Shrub 6-15 dm. high, fleshy; scale-like leaves broadly triangular, amplexicaul; spikes numerous, cylindric, 1-2 cm. long; bracts broadly rhombic; flowers small, crowded; seeds less than 0.5 mm. long. *Spirostachys occidentalis* S. Wats. Salt marshes: Utah—Ariz.—Calif.—Nev. Son. Jl-S.

14. SARCOBATUS Nees. GREASEWOOD, CHICO.

Spinescent branched shrubs, with fleshy narrow leaves, monoecious or dioecious. Staminate flowers in terminal spikes, without calyx; stamens arranged around the base of a petalate scale. Pistillate flowers axillary, solitary, with a closed compressed calyx, margined by a narrow border, which develops into a broad membranous horizontal wing. Ovary thin and hyaline; embryo spiral; endosperm scant or none.

1. *S. vermiculatus* (Hook.) Torr. Erect shrub, 1-3 m. high, divaricately branched and spinescent; leaves linear or linear-filiform, fleshy, 1-4 cm. long; aments of the staminate flowers cylindric, 0.5-3 cm. long; stamens 3; fruiting calyx about 6 mm. long, its wing-margin 6-12 mm. broad. Alkaline flats: Sask.—Tex.—Calif.—Wash. Son.—Plain—Mont. My-S.



15. **SÁLSOLA** L. SALTWORT, RUSSIAN THISTLE.

Annual or perennial herbs, or shrubs, bushy-branched, with narrow, entire, spine-tipped, rigid leaves. Flowers perfect, solitary or several together in the axils, with 2 bractlets. Sepals 5, appendaged with a horizontal wing at maturity. Stamens 5, rarely less; filaments linear or subulate. Ovary 1-celled, more or less depressed; styles 2. Utricle flattened; seeds erect; endosperm wanting, embryo spiral in form of a cone.

1. **S. Pestifer** A. Nels. Divaricately branched annual; stem 3-10 dm high; leaves filiform, somewhat fleshy, 2-6 cm. long, spine-tipped; bracts subulate, 5-10 mm. long, with stout spines; calyx membranous, conspicuously veiny, 6-7 mm. in diameter. *S. Tragus* Reichenb., not L. Waste places, fields, and loose sandy soil: Ont.—N.J.—Tex.—Calif.—Wash. *Plain—Submont.* Jl-S.

16. **DÓNDIA** Adans. SEA BLITE.

Annual or perennial herbs, or shrubby plants, more or less fleshy, with alternate, narrow, terete leaves. Flowers perfect or polygamous, solitary or clustered in the upper axils, bractate. Sepals 5, keeled or narrowly winged at maturity. Stamens 5; filaments short. Ovary 1-celled, rounded or flat on the top; styles often 2. Utricle surrounded by the calyx; seeds horizontal or vertical, endosperm wanting or scant. Embryo coiled in a flat spiral. [*Suaeda* Forskal.]

Sepals more or less fleshy, but none of them carinate; leaves narrowed at the base

Plant perennial, stout.

Seeds tubercled

Seeds not tubercled

Plant annual, more slender.

Sepals very fleshy, one or two decidedly carinate.

Leaves subulate, broadest at the base, flowers crowded.

Plant depressed, spreading

Plant erect, strict

Leaves narrowed at the base, spike slender; flowers not crowded

1 *D. Torreyana*

2 *D. intermedia*

3. *D. nigra*

4 *D. depressa*

5 *D. erecta*

6. *D. occidentalis*

1. **D. Torreyana** (S. Wats.) Standl. Undershrub, woody at the base; herbaceous branches 6-10 dm high, glabrous or somewhat pubescent, with strongly ascending branchlets; leaves subterete, filiform, 1-4 cm long, acute; bracts similar but shorter; calyx deeply cleft; seeds 1.5 mm. broad. *Suaeda Torreyana* S. Wats. *S. Moqu'ni* (Torr.) A. Nels., in part. Salt marshes: Wyo.—Tex.—N.M.—Calif.—Nev. *Son.—Submont.* Je-S.

2. **D. intermedia** (S. Wats.) Heller. Undershrub, woody at the base; herbaceous branches 2-5 dm. high, glabrous, with branchlets ascending but not strongly so; leaves narrowly linear, narrowed at the base, 1-2 cm. long; bracts shorter and broader; calyx deeply cleft, not appendaged; seeds small, less than 1 mm. broad. *Suaeda intermedia* S. Wats. Alkaline soil: Ida—Utah—Ariz—Calif. *Son.*

3. **D. nigra** (Raf.) Standl. Erect or ascending annual; stem diffusely branched, 3-5 dm. high; branches long and flexuose; leaves filiform, terete, 1-3 cm. long, acute; bracts similar, but much shorter, usually less than 1 cm. long, calyx cleft to just below the middle, fleshy; seeds vertical, 1 mm. broad, smooth *Suaeda diffusa* S. Wats. *D. diffusa* (S. Wats.) Heller. Sage plains and alkaline soil: Wyo.—N.M.—Ariz.—Ore.; n Mex. *Plain.* Jl-S.

4. **D. depressa** (Pursh) Britton. Low and decumbent annual; stems branching at the base, 2-10 dm. long; leaves linear, subulate, 1-3 cm long; bracts 5-10 mm. long, rather crowded on the branchlets; calyx cleft to the middle; seeds about 1 mm. broad, slightly reticulate *Chenopodium calceolariforme* Hook. *Suaeda depressa* S. Wats. *Dondia calceolariformis* Rydb. Saline or alkaline soil: Sask.—Kans.—Nev.—Mont. *Plain—Submont.* Jl-S.

5. **D. erecta** (S. Wats.) A. Nels. Erect annual; stems rather simple or with short erect branches, very leafy; leaves slender, 2-4 cm. long; bracts often more than 1 cm. long; calyx cleft below the middle; seeds smooth, nearly 1.5 mm. broad. Alkaline or saline flats: Sask.—Colo.—Nev.—Mont. *Plain—Mont.* Jl-S.

6. *D. occidentalis* (S. Wats.) Heller. Erect or spreading annual; stem 6-35 cm. high, with flexuose ascending or spreading branches; leaves linear, 1-2.5 cm. long, 1 mm. wide; bracts similar only slightly shorter; flowers 1-3 in each axil, seeds smooth, black and shining. Alkaline meadows: Wyo.—Colo.—Ore.—Wash. *Son.*

FAMILY 39. AMARANTHACEAE. AMARANTH FAMILY.

Coarse herbs, with alternate or opposite leaves, without stipules. Flowers inconspicuous, perfect, monoecious, dioecious, or polygamous, subtended by more or less imbricate bracts. Calyx of 2-5 scarious or herbaceous sepals. Corolla wanting. Stamens 5 or fewer, opposite the sepals. Pistil solitary, 1-celled; style 1, terminal, or wanting. Fruit a membranous utricule or pyxis.

Anthers 2-celled, green plants with alternate leaves.

Perianth present in all flowers.

Perianth wanting in the pistillate flowers.

Anthers 1-celled, stellate or woolly plants with mostly opposite leaves

Filaments united into a short cup at the base; calyx neither crested nor spiny; plants

stellate, diffuse

Filaments united into a long tube, calyx crested and tuberculate or spiny at maturity, plants woolly, erect.

1. AMARANTHUS.

2. ACNIDA.

3. TIDESTROMIA.

4. FROELICHIA.

1. AMARANTHUS (Tourn.) L. AMARANTH, PIGWEED, TUMBLEWEED.

Annual weedy herbs, with alternate, flat, pinnately veined, entire or undulate leaves. Flowers monoecious, dioecious, or polygamous, in dense spikes or clusters, each subtended by usually 3, conspicuous, green, red or purple bracts. Sepals 2-5, distinct; anthers 2-celled, opening lengthwise. Ovary 1-celled; styles or stigmas 2 or 3. Ovules solitary. Utricles circumscissile, irregularly splitting, or induricent. Seeds lenticular, shining. Embryo annular.

Sepals clawed, flowers in terminal and axillary spikes

Monoecious, sepals fimbriate, utricule circumscissile; leaf-blades linear or linear-lanceolate

Dioecious, sepals not fimbriate; utricule induricent; leaf-blades lanceolate-ovate or obovate

Bracts lanceolate, not exceeding the flowers; spike not very long.

Bracts subulate, pungent, exceeding the flowers; spikes very long

Sepals not clawed

Plants tall, simple, flowers in terminal and axillary panicles; sepals 5.

Stamens 3; sepals 1-2 mm. long, bracts 5 mm long or more

Stamens 5, sepals 2-3 mm. long, bracts 3-5 mm. long.

Spikes stout, 8-14 mm thick, strict, pistillate sepals obtuse or truncate. Inflorescence tinged with red, pistillate sepals 1.5-2 mm. long; plant glabrous.

Inflorescence pale green; pistillate sepals 3 mm. long; plant villous.

Spike slender, 4-6 mm. thick, usually drooping, stem glabrous, pistillate sepals acute.

Plant low, much branched, flowers in small axillary spike-like panicles, shorter than the leaves

Sepals 3-5, well developed

Sepals 4-5, bracts lanceolate, a little longer than the sepals; plant prostrate.

Sepals 3, bracts much longer than the sepals, pungent.

Plant erect, glabrous

Plant prostrate or diffuse, pubescent.

Sepals of the pistillate flowers, all except one, minute or wanting.

11. A. californicus.

1. *A. fimbriatus* (Torr.) Benth. Stem 3-10 dm. high, glabrous; leaves short-petioled; blades 3-7 cm. long, flowers in a loose spike; bracts shorter than the perianth, narrow, acute; sepals of the staminate flowers oblong, those of the pistillate ones broadly fan-shaped, 2-3 mm. long. Sandy places: s Utah—Nev.—Calif.; n Mex. *L. Son.* Au-S.

2. *A. Torreya* (A. Gray) Benth. Stem 3-10 dm. high, somewhat pubescent or glabrate; leaves long-petioled; blades lanceolate or oblong-lanceolate, strongly veined beneath; flowers in a rather lax panicle; sepals of the staminate plant

lanceolate, spinulose-cuspidate, more or less scarious-margined; sepals of the pistillate plants obovate-spatulate, rounded at the apex. Sandy soil: Ia.—Tex.—Calif.—Nev. *Plain*—Son. Jl—Au.

3. *A. Palmeri* S. Wats. Stem erect, 6–10 dm. high, branching; leaves long-petioled; blades rhombic-lanceolate or obovate, 2–5 cm. long, strongly veined beneath; sepals of the staminate flowers lanceolate, spinulose-cuspidate, those of the pistillate flowers 2–3 mm. long, oblong or somewhat spatulate, distinct or nearly so. Banks and river valleys: Kans.—Tex.—Colo.—Calif.; n Mex. Son.—*Submont.*

4. *A. Powellii* S. Wats. Stem 3–15 dm. high, glabrous, simple or with erect branches; leaves slender-petioled; blades lanceolate or ovate, 3–10 cm. long; bracts subulate, spinulose-cuspidate, 3 mm. long; sepals 1–2 mm. long, lanceolate, mucronate. Loose or sandy soil: N M.—Wyo.—Ore—Calif.; n Mex. Son.—*Mont.* Jl—S.

5. *A. Wrightii* S. Wats. Stem 2–10 dm. high, simple or branched at the base; leaves slender-petioled; blades lance-elliptic to rhombic-ovate, 1.2–6 cm. long, yellowish green, paler beneath; bracts linear-lanceolate or subulate, longer than the sepals, pungent; sepals 1.5–2 mm. long, rounded or truncate and retuse at the apex. Sandy soil: N M.—s Colo—Ariz. Son.

6. *A. retroflexus* L. Stem erect or ascending, usually branched, 3–30 dm. high; leaves petioled; leaf-blades ovate or rhombic-ovate to lanceolate, 5–15 cm. long; bracts subulate, twice as long as the oblong, scarious sepals. *PIGWEE*. Waste places and fields: Vt.—Fla.—Calif.—B.C.; Mex.; nat from Eu. *Plain*—*Submont.* Je—O.

7. *A. hybridus* L. Stem branched, 6–25 dm. high; leaves petioled; leaf-blades ovate, 4–10 cm. long, darker green above, scabrous-puberulent; bracts subulate, twice as long as the oblong acute sepals. Waste places: R I.—Fla—Colo.—Calif.—Alta.; Mex.; W. Ind.; nat. from Eu. *Plain*—Son. Mr—S.

8. *A. blitoides* S. Wats. Stem 3–10 dm. long, glabrous or nearly so, profusely branched; leaf-blades broadly spatulate, obovate or oblanceolate, 1–3 cm long; bracts short-acuminate, 2–3 mm. long; sepals obtuse and mucronate or acute; utricle not rugose. Dry ground, roadsides, and waste places: Minn—La.—Calif.—B.C.; Mex.; adv. eastward to Me. and N. J. *L. Son.*—*Plain*—*Mont.* Jl—S.

9. *A. graecizans* L. Stems bushy-branched, whitish, 2–6 dm. high; leaf-blades oblong or spatulate, 1–4 cm. long, papillose, mucronate-cuspidate; flowers polygamous; sepals membranous. *A. albus* L. *TUMBLE WEED*. Waste places and cultivated ground: R.I.—Fla.—Calif.—B.C.; W. Ind.; Mex.; and Old World. *Plain*—*Submont.* Jl—S.

10. *A. pubescens* (Uline & Bray) Rydb. Stem spreading, pubescent with a viscid pubescence; leaf-blades spatulate, 1–3 cm. long, very crisp, mucronate; sepals thicker than in *A. graecizans*. Sandy places: N.M.—Colo.—Ariz. Son.

11. *A. californicus* (Moq.) S. Wats. Stem prostrate, glabrous, branching at the base, 2–5 dm. long; leaf-blades obovate or oblong, 5–20 mm. long, often with white veins and margins; bracts lanceolate, membranous, acuminate, sepals of the staminate flowers 1.5 mm. long, the single one of the pistillate flowers shorter, lateral; utricle rugose. *A. carneus* Greene. Cultivated or loose ground: Calif.—Nev.—Alta.—Wash. Jl—S.

2. ACNIDA L. WATER-HEMP.

Annual coarse herbs, with branching stem and alternate, narrow, entire, pinnately veined leaves. Flowers dioecious, subtended by 1–3 bracts, in terminal or axillary, continuous or interrupted spikes. Staminate flowers with 5 scarious mucronate sepals. Stamens 5; filaments distinct, subulate; anthers 2-celled. Pistillate flowers without calyx. Ovary 1-celled; stigmas 2–5, papillose or plumose. Ovules solitary. Utricle circumscissile or opening irregularly, or indehiscent. Seeds smooth, erect, shining.

Pistillate inflorescence of slender interrupted spikes; fruit circumscissile 1. *A. tamariscina*.
Pistillate inflorescence of closely clustered spikes; fruit indehiscent or irregularly splitting.
2. *A. altissima*.

1. *A. tamariscina* (Nutt.) Wood. Stem erect, much branched, 1-2 m. long; leaf-blades lanceolate or ovate-lanceolate, obtuse or notched at the apex, entire or undulate; bracts lanceolate, spinulose-tipped, scarious-margined. Swamps and alluvial soil: Ill.—S.D.—Colo.—N.M.—La. Plain. Jl-S.

2. *A. altissima* Riddell. Stem 1-3 m. high, with flexuose branches; leaf-blades lanceolate to rhombic-ovate, entire; bracts rigid, acuminate; sepals of the staminate flowers lanceolate, acuminate. *A. tuberculata* Moq. Swamps: Ont.—S.D.—Colo.—Ohio. Plain. Jl-S.

3. TIDESTRÔMIA Standl.

Annual or perennial herbs, with stellate pubescence and mostly opposite, entire or merely undulate, short-petioled leaves. Flowers perfect, subtended by 3 bracts, solitary or clustered in the axils. Sepals 5, unequal, pubescent. Stamens 5; filaments united at their bases; anthers 1-celled. Ovary 1-celled; styles short; stigmas capitate or 2-lobed. Ovules solitary. Utricle subglobose, indehiscent. [*Cladothrix* Nutt., not Cohn.]

1. *T. lanuginosa* (Nutt.) Standl. Annual; stems diffusely branched; branches ascending or prostrate, 1-6 dm. long; leaf-blades rhombic-ovate to orbicular, entire, 0.5-2 cm. long; flowers in axillary clusters; bractlets obtuse; utricle glabrous, included in the calyx. *Cladothrix lanuginosa* Nutt. Dry soil: Tex.—Kans.—Utah—Ariz.; Mex. Son. Jl-S.

4. FROELICHIA Moench.

Annual or biennial herbs, with woolly or silky pubescence and opposite, entire or undulate leaves. Flowers perfect, subtended by 3 bracts, in dense spikes. Calyx 5-lobed, woolly; tube longitudinally crested or tubercled at maturity. Stamens 5, included; filaments united into a tube; anthers 1-celled. Ovary 1-celled; styles short or wanting; stigmas capitate or brush-like. Utricle indehiscent, enclosed in the tube of the filaments.

Stout, 4-12 dm. tall; crest of fruiting calyx continuous, dentate. 1. *F. campestris*.
Slender, 2-5 dm. high, crest of fruiting calyx interrupted, forming distinct spines.
2. *F. gracilis*.

1. *F. campestris* Small. Biennial or annual; leaves numerous and approximate below; blades spatulate to oblong or broadly linear, acute, white-woolly beneath; spikes 1-10 cm. long. *F. floridana* Coult. & Nels., not Moq. Dry or sandy soil: Minn.—Ill.—Okla.—N.M.—Colo. Plain—Son. Je-S.

2. *F. gracilis* Moq. Annual or perhaps biennial; stem usually branched at the base, 2-3 dm. high; leaves numerous near the base of the plant, often clustered; blades linear-oblongate or linear-oblong, 1-5 cm. long, acute, white-woolly; spikes 1-3 cm. long. Sandy valleys: Ia.—Ark.—Tex.—Ariz.—Colo.; Mex. Plain—Son. Jl-S.

FAMILY 40. NYCTAGINACEAE. FOUR-O'CLOCK FAMILY.

Annual or perennial herbs (all ours), usually with swollen nodes, and alternate or opposite leaves, without stipules. Flowers regular, perfect, often subtended by bracts forming a calyx-like involucre. Perianth simple, corolla-like, campanulate or funnelform. Stamens 1-many. Pistil solitary; ovary 1-celled, surrounded by the perianth-tube. Fruit indehiscent, angled, ribbed, or winged.

Bracts distinct

Fruit crested or winged, bracts in a whorl at the base of the head-like cluster; perianth salverform.

Bracts conspicuous

Wings not completely encircling the fruit, interrupted above and below.

1. ABRONIA.

- Wings completely encircling the fruit. 2. *TRIPTEROCALYX*.
 Bracts inconspicuous or lacking. 3. *SELINOCARPUS*.
 Fruit globular, neither crested nor winged; bracts attached each to a pedicel of the
 umbel-like or corymbose inflorescence, perianth funnelliform. 4. *HERMIDIUM*.
 Bracts united.
 Fruit neither strongly tubercled nor winged.
 Fruit not ribbed, involucre herbaceous, little if at all enlarging in fruit, not be-
 coming membranous.
 Stamens usually 5; involucre campanulate, not enlarged in fruit.
 Flowers several in each involucre 5. *QUAMOCLIDION*.
 Flowers solitary in each involucre 6. *HESPERONIA*.
 Stamens 3, involucre rotate, somewhat enlarged in fruit in the manner of the
 next genus, but not membranous 7. *ALLIONIELLA*.
 Fruit ribbed, involucre rotate, in fruit becoming much enlarged and membranous 8. *ALLIONIA*.
 Fruit with two rows of strong tubercles on the back and surrounded by two-toothed
 inflexed wings 9. *WEDELIELLA*.

1. *ABRÒNIA* Juss. SAND VERBENA, SAND PUFFS.

Annual or perennial herbs, with opposite petioled leaves. Leaf-blades entire and oblique at the base. Flowers several in heads, surrounded by five or more distinct bracts. Perianth colored and corolla-like, salver-shaped, with an elongated tube, and expanding above into a 5-lobed limb. Stamens 3-5, included. Fruit leathery, 3-5-winged, or 3-5-ribbed. Seed filling the pericarp and adherent to it.

- Fruit biturbinate, *i. e.*, tapering at both ends, irregularly ridged or crested
 Flowers about 2 cm. long; limb 5-10 mm. wide.
 Bracts broadly obovate, over 1 cm. long. 1. *A. fragrans*
 Bracts ovate-lanceolate, less than 1 cm. long. 2. *A. nudata*
 Flowers about 1 cm. long, limb 3-5 mm. wide, bracts ovate to lanceolate-ovate, 5-8
 mm. long.
 Petioles of the stem-leaves shorter than the very thick blades; plant low, about 1
 dm. high. 3. *A. pumila*.
 Petioles of the stem-leaves much longer than the moderately thick blades, plant
 slender, 2-4 dm. high. 4. *A. ammophila*.
 Fruit turbinate or obpyramidal, *i. e.*, almost truncate above, distinctly winged, the
 wings very broad above.
 Plant almost acaulescent; stem and leaves greatly surpassed by the long peduncles 5. *A. nana*.
 Plant with an elongated stem.
 Bracts broadly ovate or obovate, acute or obtusish.
 Stem distinctly viscid-pubescent, leaves scabrous-puberulent, bracts 1-1.5 cm.
 long.
 Blades of the stem-leaves elliptic, bracts broadly obovate, 12-15 mm. wide,
 obtusish. 6. *A. salsa*.
 Blades of the stem-leaves lanceolate; bracts oval, acute, about 6-7 mm.
 wide. 7. *A. fallax*.
 Stem finely puberulent or glabrous; leaves glabrous; bracts 5-8 mm. long.
 Stem puberulent, leaves long-petioled, bracts 8-15 mm. long. 8. *A. elliptica*.
 Stem glabrous, leaves short-petioled, bracts 5 mm. long. 9. *A. glabra*.
 Bracts oblong-lanceolate or lanceolate, attenuate or cuspidate. 10. *A. lanceolata*.
 Stem glabrous.
 Stem more or less pubescent.
 Stem puberulent, wings with double lamina, corlaceous.
 Stem villous, wings with single lamina, membranous. 11. *A. Carletoni*.
 12. *A. villosa*.

1. *A. fragrans* Nutt. Perennial; stems several; branches erect, 15-25 dm. high, glabrous below, puberulent and subviscid above; leaves glabrous or nearly so, petioled; blades oval, ovate, or elliptic, rounded at the apex, 3-6 cm. long; fruit about 8 mm. long, 4 mm. broad, one-third from the apex. Dry soil. S D —la.—Kans.—N.M.—Ida.—Mont. *Plain—Submont.* My-Jl.

2. *A. nudata* Rydb. Perennial; stems very long and decumbent, sparingly hispidulous; leaf-blades broadly lanceolate, thick, glabrous, 2-5 cm. long; flowers many, about 2 cm. long; limb 5-6 mm. wide; achenes thickest a little above the middle, crested, 8-10 mm. long, those of the marginal flowers very obliquely ovoid-fusiform, scarcely at all crested. Barren hills: e Mont. *Plain.* S.

3. *A. pumila* Rydb. Perennial, caespitose; stems ascending, about 1 dm. long, puberulent; leaf-blades 1.5-3 cm. long, thick, minutely puberulent, oval, elliptic or somewhat ovate; fruit bipyramidal, broadest one-third from the apex, merely crested or the inner ones somewhat winged. Cañons: Utah. Je-Jl.

4. *A. ammophila* Greene. Glandular-puberulent perennial; stem 3-4 dm. high, decumbent, branched; leaf-blades 1.5-2 cm. long, oblong-elliptic, obtuse, thick; flowers greenish or yellowish white; fruit bi-turbinate, with about 5 low rounded crests. *A. arenaria* Rydb. *A. cheradophila* A. Nels. *A. Nelsonii* Heimerl. Sandy places: Yellowstone Park. *Submont.*—*Mont.* Au.

5. *A. nana* S. Wats. Dwarf caespitose perennial, with thick caudex; stems less than 1 dm. long; leaf-blades 8-20 mm. long, oval, rough-puberulent; involucre of 4 or 5, ovate or lanceolate bracts, 6-10 mm. long; flowers greenish, 12-14 mm. long; fruit cuneate-turbinate, with 5 hollow wings. Dry ravines and valleys: s Utah—Ariz.—Calif. *Son.* Je.

6. *A. salsa* Rydb. Perennial; stem ascending, 3-4 dm. high, densely viscid-pubescent; leaf-blades oval or elliptic, very thick, puberulent, obtuse, or the lowest rounded-oval, 3-5 cm. long, 1-3 cm. wide; bracts about 15 mm. long; flowers many, about 2 cm. long, limb about 4 mm. wide; fruit about 1 cm. long. Sandy beaches of salt lakes: Utah. *Son.* My-Jl.

7. *A. fallax* Heimerl. Perennial; stem erect, almost shrubby below, branched, straw-color or white, viscid-pubescent above; leaf-blades thick, puberulent, oval, those of the upper long-lanceolate, 2-5 cm. long, 1-1.5 cm. wide; flowers many, about 15 mm. long; fruit with the wings about 6 mm. wide and 8 mm. long, cuneate-obpyramidal. Sandy places: Utah. *Son.* Au.

8. *A. elliptica* A. Nels. Perennial, with a thick root; stems several, ascending, 1-3 dm. long; leaf-blades fleshy, glabrous, elliptic or oval, 1.5-3 cm. long; bracts obovate, subacute, 8-15 mm. long; flowers greenish white, 15-20 mm. long; fruit obscurely pubescent, turbinate, truncate or somewhat obcordate, with 5 wings, 7 mm. long. Clay hills: Wyo.—Colo.—Utah. *Son.*—*Submont.* My-Jl.

9. *A. glabra* Rydb. Perennial; stem ascending, about half a meter high; leaf-blades oval to oblong, thick, 1-4 cm. long, obtuse; bracts obovate, about 5 mm. long, acute; flowers 12-15 mm. long, numerous; fruit cuneate-obpyramidal, with the wings 4-5 mm. wide; wings very thick, of two lamina, semi-cordate at the apex. Arid places: Colo. *Son.* Jl.

10. *A. lanceolata* Rydb. Perennial; stem glabrous, decumbent, several decimeters long; leaf-blades oblong-oval, rather thick, glabrous, 2-5 cm. long, 1-1.5 cm. wide; bracts 6-8, lanceolate, about 1 cm. long; flowers numerous, about 1.5 cm. long, with a limb 4-5 mm. wide; fruit with the thin wings about 8 mm. wide, cuneate-obpyramidal. Drifting sand: Ida. *Son.* Jl.

11. *A. Carletoni* Coult. & Fisher. Perennial, with a thick root; stems decumbent, glandular-puberulent, 2.5-4 dm. high; leaf-blades thick, linear-oblong or oblong-ovate, 3-5 cm. long; bracts rose-colored, 6 mm. long; flowers rose-colored; fruit turbinate, with 5 coarsely reticulate wings. Plains: Colo. *Plain.* My-Je.

12. *A. villosa* S. Wats. Perennial; stems weak and slender, decumbent or ascending, densely villous; leaf-blades 0.5-3 cm. long, ovate or elliptic, obtuse or acute; bracts 6-8 mm. long; flowers pink, 15-20 mm. long; fruit with 3-5 broad wings, membranous, with a simple lamina, truncate above. Sandy places: Ariz.—s Utah—Calif. *L. Son.* Ap-Au.

2. *TRIPTEROCALYX* Hook. SAND PUFFS.

Branched annuals, with opposite petioled leaves. Blades entire and usually oblique at the base. Flowers perfect, in heads surrounded by 4-6 distinct bracts. Perianth corolla-like, salverform, with elongated tube and 5-lobed limb. Stamens 5, regularly adnate to the perianth-tube. Fruit almost orbicular in outline, completely surrounded by 2-4, strongly reticulate, membranous wings. Seeds cylindric-ellipsoid.

Flowers 3 cm. or more long, limb about 1 cm. wide; peduncles longer than the leaves

1. *T. cyclopterus*.

Flowers 1.5-2 cm. long, limb about 5 mm. wide

Stem glabrous or nearly so; peduncles often nearly equalling the leaves.

2. *T. pedunculatus*

Stem densely pubescent; peduncles at least in flower much shorter than the leaves.

3. *T. micranthus*.

1. **T. cyclopterus** (A. Gray) Standl. Annual; stem stout, 2-5 dm. long, puberulent; leaf-blades elliptic, lance-elliptic, or oval, 2-5 cm. long, more or less pubescent; bracts lanceolate, 8-10 mm. long; fruit with the wings 2-3 cm in diameter, emarginate at each end; body usually 3-nerved. *Abronia cycloptera* A. Gray. Plains: Tex.—Colo.—Calif. Son. My—Au

2. **T. pedunculatus** (M. E. Jones) Standl. Annual; stem 2-3 dm. long, glabrous or nearly so; leaf-blades elliptic or oval, 2-5 cm. long; bracts ovate, about 4 mm. long, acuminate or abruptly acute; fruit about 18 mm. long, often red; body 3-nerved. *A. micrantha pedunculata* M. E. Jones. Perhaps not specifically distinct from the next. Sandy or gravelly places: Utah. Son. Ap-Je.

3. **T. micranthus** (Torr.) Hook. Annual; stem branched at the base, decumbent or ascending, 1-3 dm. high, more or less pubescent; leaf-blades 2-4 cm. long, elliptic, about equalling the petioles; bracts ovate, acuminate, 4-5 mm. long; fruit with the wings 1-1.5 (rarely 2) cm. broad; body spongy-reticulate, not nerved. *A. micrantha* Torr. Dry plains and in sandy soil: Sask.—Kans.—N.M.—Mont. Plain—Mont. My-Jl.

3. SELINOCARPUS A. Gray.

Perennial herbs or somewhat shrubby plants. Leaves opposite, thick and sometimes fleshy. Flowers solitary in the axils of the leaves or clustered at the ends of the branches. Bracts when present small and inconspicuous, distinct. Perianth funnelform with a spreading limb. Stamens 2-5, exserted. Fruit with 3-5 prominent membranous wings.

1. **S. diffusus** A. Gray. Perennial, with a woody caudex, caespitose at the base; stems 1-2 dm. high, scabrous-hispidulous, canescent; leaf-blades ovate to suborbicular [var. *nevadensis* Standl.] obtuse, 1-3 cm. long, hispidulous on both sides; flowers about 3 cm. long, greenish, hispidulous; fruit about 7 mm. long; wings 2 mm. wide. Arid regions: Tex.—s Utah. L. Son.

4. HERMIDIUM S. Wats.

Perennial glabrous herbs, with entire, opposite, short-petioled leaves. Flowers perfect, 3 together, subtended by as many leaf-like distinct bracts. Perianth campanulate, purplish, slightly lobed. Stamens 5-7, about as long as the perianth. Fruit subglobose, smooth, glabrous. Seed enclosed in the pericarp.

1. **H. alipes** S. Wats. Stem stout, ascending, 3-6 dm. high; leaf-blades 2-6 cm. long, broadly ovate, subcordate, short-petioled; bracts 12-20 mm. long, ovate-cordate, acute, more or less colored; heads about 6-flowered; calyx campanulate, light purple, somewhat 5-lobed; fruit globular, narrowly 3-winged. Foot-hills: Utah—Nev.—Calif. Son. My.

5. QUAMOCLIDION Choisy. FOUR-O'CLOCK.

Perennial herbs, with opposite, thick, entire leaves. Flowers perfect, usually large, several in umbels, surrounded by a gamophyllous involucre. Perianth corolla-like, funnelform or trumpet-shaped. Stamens 5, exserted. Fruit hard, smooth, ellipsoid or subglobose, glabrous. Pericarp adherent to the seed.

1. **Q. multiflorum** Torr. Perennial, with a thick root; stem stout, spreading or ascending, 6-10 dm. long; leaf-blades broadly ovate or subcordate, acute, 3-7 cm. long; involucre large, its bracts united half way up or further, acute or acuminate; heads usually 6-flowered; perianth broadly funnelform, rose-colored to purple, 4-5 cm. long; fruit ovate-oblong, 6-8 mm. long, 10-furrowed toward the base. *Mirabilis multiflora* A. Gray. Valleys: Tex.—Colo.—Utah—Calif. Son.—Mont. Je-S.

6. HESPERONIA Standl.

Perennial herbs, with opposite, entire leaves. Involucres campanulate, of 5 bracts united at their base, not enlarged in fruit. Flowers solitary in each involucre. Perianth campanulate, white or purplish. Stamens usually 5, distinct. Fruit ellipsoid or globose, neither angled nor ribbed, glabrous.

1. *H. limosa* (A. Nels.) Standl. A perennial with a woody base; stems ascending 3-6 dm high, nearly glabrous; leaf-blades thick, rounded-ovate to cordate, 1-3 cm. long; involucre 4-6 mm. long; calyx rose-colored or purple, campanulate, about 1 cm. high; fruit ovate, smooth, 3 mm. long. *Mirabilis glutinosa* and *M. limosa* A. Nels. Dry hillsides: Utah—Ariz.—Calif.—Nev. Son. F-Jc.

7. ALLIONIÉLLA Rydb.

Branched perennial herbs, with opposite petioled leaves. Bracts five, united into a gamophyllous viscid rotate involucre, which enlarges somewhat in fruit, but does not become membranous. Flowers in each involucre 3. Perianth open, short funnellform, 5-lobed. Stamens 3, distinct. Fruit ellipsoid, neither angled nor ribbed, very indistinctly tubercled, glabrous.

1. *A. oxybaphoides* (A. Gray) Rydb. Perennial; stems diffusely branched, procumbent; leaf-blades cordate, often somewhat acuminate, 2-5 cm. long, more or less puberulent; involucre deeply 5-cleft, glandular-viscid, 6 mm. long; perianth campanulate, 7-8 mm. long. Ravines and valleys: Tex.—Colo.—Utah—Ariz. Son.—Submont. Je-S.

8. ALLIÖNIA Loeffl. UMBRELLA-WORT.

Perennial herbs, with rather fleshy, entire, opposite leaves. Flowers perfect, 1-5 in each involucre, in ours rose-colored or white. Involucre gamophyllous, 5-lobed, in fruit enlarging and membranous. Perianth campanulate or funnel-form, often oblique. Stamens 2-5, unequal; filaments very slender and united at the base. Fruit club-shaped, 5-angled or 5-ribbed, usually pubescent and minutely tuberculate. Pericarp adhering to the seed. Endosperm mealy. [*Oxybaphus* L'Her]

Leaves cordate to broadly ovate-lanceolate, all distinctly petioled

Leaf-blades cordate or deltoid

Leaf-blades ovate, rounded or cuneate at the base

Stem glabrous, leaves thin and soft, inflorescence not bracteate. 2 *A. floribunda*

Stem hirsute, leaves thick and fleshy, inflorescence bracteate 3. *A. polytricha*

Leaves ovate-lanceolate, oblong, or linear, sessile, or only the lower short-petioled.

Stem more or less hirsute as well as viscid

Fruit pubescent

Leaves ovate or broadly oblong, as well as the stem conspicuously hirsute.

Leaves linear-lanceolate, almost glabrous, stem sparingly hirsute, or glabrous except under the nodes.

Fruit glabrous

Stem glabrous below, not hirsute, viscid-puberulent above.

Flowers solitary in the involucre, on short slender pedicels; fruit nearly glabrous.

Flowers 2-3 in the involucre, subsessile; fruit decidedly pubescent.

Lower leaves ovate, rounded at the base.

Lower leaves lanceolate to linear, tapering at the base.

Leaves of the cymes much reduced and bract-like, upper portion of the stem densely and finely puberulent

Leaves of the cymes neither much reduced nor bract-like.

Leaves erect or ascending, lobes of the involucre rounded or broadly triangular-ovate

Plant prostrate or diffuse; involucre and branches of the inflorescence densely viscid-hairy

Plants more simple, erect or ascending; branches of the inflorescence usually merely viscid-puberulent.

Leaves from ovate- or obovate- to linear-lanceolate, usually over 5 mm wide.

Leaves narrowly linear, less than 5 mm. wide.

Leaves divergent, distinctly petioled, lobes of the involucre elliptic or oval.

1. *A. nyctaginea*.

4. *A. hirsuta*

2. *A. floribunda*

3. *A. polytricha*

5. *A. pilosa*.

6. *A. Carletoni*.

7. *A. glabra*.

8. *A. sessilifolia*

9. *A. bracteata*.

10. *A. diffusa*.

11. *A. decumbens*.

12. *A. linearis*

13. *A. distaricata*.

1. *A. nyctaginea* Michx. Stems 3-10 dm. tall, stout, dichotomously branched; leaf-blades 2-10 cm long; inflorescence paniculate; involucre in fruit about 1.5 cm. broad, pubescent; lobes ovate or triangular; perianth red, hairy without. *Oxybaphus nyctagineus* Sweet. Rich soil: Sask.—Ill.—La.—N.M.—Wyo. Plain. My—Au.

2. *A. floribunda* (Choisy) Kuntze. Stems 3-9 dm. high, stoutish, swollen at the nodes; leaf-blades ovate to lanceolate, 2-5 cm. long; inflorescence panic-

late, pubescent; fruiting involucre fully 1.5 cm. broad, glabrate; lobes triangular; perianth usually white; fruit obovoid, constricted near the base. *A. ovata* Pursh. *O. floribundus* Choisy. Dry soil: S.D.—Mo.—Tex.—N.M.—Wyo. *Plain*. Jl-S.

3. *A. polytricha* Standl. Stem sparingly branched, hirsute below; branches and inflorescence soft-pubescent; leaf-blades glabrous or sparingly pilose, ovate, the uppermost narrowly so, obtuse or rounded at the apex; involucre about 1 cm. wide; lobes broadly ovate, more or less densely pubescent. Cañons: Colo. Jl-Au.

4. *A. hirsuta* Pursh. Stem strict, 4-8 dm. high, glandular in the paniculate inflorescence; involucre glandular-pubescent, in fruit 1.5 cm. wide; lobes broadly ovate; perianth purple or pink, pubescent without. *A. aggregata* (Ortega) Speng., a form with axillary involucre. Sandy soil: Sask.—Minn.—Neb.—N.M.—Wyo. *Plain-Submont.* Je-Au

5. *A. pilosa* (Nutt.) Rydb. Stem erect or decumbent at the base, 3-12 dm. high; leaf-blades lanceolate or oblong, 2-9 cm. long, thick, nearly glabrous, inflorescence cymose, glandular; fruiting involucre 1.2-2 cm. broad; lobes triangular-ovate; perianth purplish. Dry sandy soil: Sask.—Wisc.—La.—Tex.—Colo.—N.D. *Plain-Submont.* Jl-Au.

6. *A. Carletoni* Standl. Stem about 1 m. high, simple below, soft-pubescent throughout; leaves sessile or nearly so, lanceolate, very thick, acutish, wavy-margined, strongly veined, 7 cm. long, puberulent on both sides; involucre about 15 mm. wide, copiously soft-pubescent, the lobes rounded; fruit 5 mm. long, with 5 prominent smooth ribs. Plains: Kans.—Colo.—Okla. *Plain* Je-Jl.

7. *A. glabra* (S. Wats.) Kuntze. Stem 6-10 dm. high, erect, branched, glabrous; leaf-blades linear, 6-12 cm. long, thick, glabrous, sessile; inflorescence a large panicle; flowers solitary; fruiting involucre about 1 cm. broad, glabrous, lobes triangular, thin, veiny. Dry soil: s Utah—Colo.—N.M.—Ariz.; Chihuahua. *Son.* Au-S.

8. *A. sessilifolia* Osterh. Stem stout, 5-10 dm. high, erect, branched above, angled; leaves thickish, sessile, 6-8 cm. long, 4 cm. wide; involucre densely hirsute, in fruit 1 cm. broad; perianth purple or pink. Valleys: Colo. *Submont.* Jl.

9. *A. bracteata* Rydb. Stem 4-12 dm. high, erect or ascending; leaf-blades oblong to linear-lanceolate or linear, 3-9 cm. long, thick; involucre often numerous, in terminal cymes, 10-14 mm. wide; lobes broadly ovate, obtuse; perianth white or pale, about 10 mm. broad. Dry and rocky soil. Mo.—Ala.—S.D. *Plain.*

10. *A. diffusa* Heller. Stem 2-3 dm. long; leaves sessile, linear-lanceolate, often narrowly so, 5-6 cm. long, thick; fruiting involucre 7-10 mm. wide; lobes triangular-ovate; perianth rose-colored to white, 6 mm. long; fruit inconspicuously ribbed. *A. glandulifera* A. Nels. *A. viscida* (Eastw.) Cockerell. Gravelly hills and sandy plains: N.D.—Kans.—N.M.—Ariz.—Wyo. *Son.—Plain-Mont.* Je-Au.

11. *A. decumbens* Nutt. Stem erect or ascending, 4-15 dm. high, leaf-blades 3-10 cm. long, very thick, obtuse or blunt at the apex; involucre numerous, usually in terminal cymes, 1-1.5 cm. wide; lobes rounded-ovate, sometimes acutish; perianth pink, about 10 mm. broad. *A. decumbens* was originally described from a form with axillary involucre. *A. lanceolata* Rydb represents the ordinary form. Dry sandy soil on plains and prairies: Man.—Tenn.—Tex.—N.M.—Wyo. *Plain-Submont.* My-S.

12. *A. linearis* Pursh. Stem slender, 3-15 dm. high, terete or 4-angled below, erect or ascending; leaf-blades thick, linear, 2.5-10 cm. long, undulate, sessile, or the lower sometimes short-petioled; perianth finely pubescent, purple. *O. angustifolius* Sweet. *A. montanensis* Osterh. *A. Bodini* (Holz.) Morong, a form with axillary involucre. Dry soil: Minn.—La.—Ariz.—Mont.; Mex. *Plain-Mont.* Jl-O.

13. *A. divaricata* Rydb. Stems usually solitary, erect, 6-10 dm. high; leaf-blades glabrous, linear to linear-lanceolate, acute, 5-10 cm. long; involucre numerous, in terminal cymes, about 1.5 cm. wide; lobes elliptical or oval, obtuse; perianth pink, about 8 mm. wide. Sandy valleys: N.M.—Colo.—Ariz. *Son.*—*Submont.* Jl—Au.

9. WEDELIELLA Cockerell.

Annual or perennial prostrate herbs, with opposite petioled leaves; blades entire, oblique at the base. Flowers perfect, 3 in each involucre, which is composed of 3 sepal-like bracts united at the base. Perianth corolla-like, with a short oblique tube and a 4-lobed limb. Fruit leathery, winged on each side, smooth or rarely crested on the inner face and with two rows of glands on the outer. Seeds filling the pericarp to which it adheres. Endosperm mealy. Stamens 4; filaments slender. [*Wedelia* Loeffl. *Allonia* L., in part.]

1. *W. incarnata* (L.) Cockerell. Perennial; stem diffusely branched at the base, prostrate, 1-5 dm long; leaf-blades thick, ovate or oblong, 1-3 cm. long, undulate; bracts of the involucre oval or orbicular, 4-6 mm. long, reticulate, ciliate; calyx rose or white, 5-6 mm. long; fruit 3-4 mm. long. *Allionia incarnata* L. *Wedelia incarnata* (L.) Kuntze. Valleys: Tex.—Colo.—Utah—Ariz.; Mex.; Trop Am., and S. Am. *Son.* My—N.

FAMILY 41. TETRAGONIACEAE. CARPET-WEED FAMILY.

More or less succulent herbs, with opposite or whorled leaves. Flowers in ours perfect, regular. Sepals 4 or 5. Corolla wanting in our species. Stamens 4 or 5, or many, hypogynous. Gynoecium of 2 or more united carpels; ovary 2-several-celled or by reduction 1-celled, superior or partly inferior, styles as many as the cells of the ovary. Fruit a circumscissile or loculicidal capsule.

Hypanthium wanting; capsule loculicidal, leaves whorled.

1. MOLLUGO.

Hypanthium manifest, capsule circumscissile, leaves opposite

2. SESUVIUM.

1. MOLLUGO L. INDIAN CHICKWEED, CARPET-WEED.

Annual herbs, with verticillate leaves and hyaline stipules. Flowers perfect, in axillary clusters, cymes, or racemes, pedicelled, usually white. Sepals 5, persistent, with hyaline margins. Stamens 3, opposite the angles of the ovary, or 5, alternating with the sepals; filaments filiform or subulate. Ovary 3-5-celled, superior, styles 3-5, distinct; stigmas entire. Capsule 3-5-valved.

1. *M. verticillata* L. Annual; stem branched at the base, prostrate, 0.5-3 dm long; leaves in whorls of 4-8, short-petioled; blades unequal, spatulate to linear-oblancoolate, 1-3 cm long, entire; sepals 2 mm long, oblong, with white margins; capsule oblong or oval, 4-5 mm. long. Waste places and cultivated ground. Ont.—Fla.—Tex.—Calif.—Wash.; Mex.; W. Ind., C. Am., and S. Am. *Plain*—*Son.* Ja—D.

2. SESUVIUM L. SEA PURSLANE.

Annual or perennial herbs or shrubby plants, with fleshy opposite leaves, without stipules. Flowers axillary. Hypanthium in ours turbinate. Sepals 5, usually horned on the back near the tip. Stamens 1-many, perigynous. Ovary 3-5-celled, half-inferior; styles 3-5, distinct, filiform; ovules numerous. Fruit a circumscissile capsule; seeds several or many in each cavity.

1. *S. sessile* Pers. Perennial, with a thick root; stems diffuse, branched at the base, prostrate or ascending, 1-8 dm long; leaf-blades spatulate or oblanceolate, 1-3 cm. long; sepals ovate-oblong, 8-10 mm. long; stamens many; capsule oblong, 6 mm. long. River banks and saline plains: Wyo.—Kans.—Tex.—Calif.; Mex. and S. Am. *Son.* Ap—N.

FAMILY 42. **PORTULACACEAE**. PURSLANE FAMILY.

Succulent plants, with opposite or alternate leaves. Flowers perfect, regular. Sepals 2, or in *Lewisia* 6-8. Petals 4 or 5, rarely more, imbricate. Stamens as many as the petals. Gynoecium of 2-5 united carpels; ovary 1-celled, usually superior; styles 2-5, distinct or partly united. Fruit a valvate or circumscissile capsule.

Ovary wholly superior.

Styles or stigmas 3-8; sepals not accrescent, inflorescence not secund.

Sepals deciduous, scarious, capsule 3-valved; plant with fleshy rootstock or roots with terete leaves 1. *TALINUM*.

Sepals persistent, at least in part herbaceous.

Capsule 3-valved, styles 3.

Plants with a corm, or a fleshy root, crowned with a short caudex; cauline leaves opposite; ovules usually 6 2. *CLAYTONIA*

Plants annual, or perennial, with slender rootstocks; ovules usually 3.

Stem-leaves opposite

Stem-leaves a single pair; plant neither rooting at the nodes nor flagelliferous. 3. *LIMNIA*.

Stem-leaves of several pairs; plant floating and rooting at the nodes, usually flagelliferous. 4. *CRUNOCALLIS*

Stem-leaves alternate.

Leaves very fleshy; perennials, with bulblets and creeping stems or stolons 5. *NAIOCRENE*

Leaves not fleshy; erect annuals, without bulblets and stolons 6. *MONTIASTRUM*

Capsule circumscissile near the base

Sepals 6-8, scape jointed above the middle, with 2 or more subulate bracts at the joint. 7. *LEWISIA*.

Sepals 2; scape not jointed near the middle

Plants with a thick perennial root, bearing one or several short caudices 8. *OREOBROMA*

Plants with a globular corm and a slender stem bearing 2-3 verticillate leaves. 9. *EROCALLIS*

Styles or stigmas 2; capsule 2-valved, sepals scarious and accrescent, inflorescence secund. 10. *SPRAGUEA*.

Ovary partly inferior, circumscissile; ours low spreading leafy annuals, with flat leaves

11. *PORTULACA*.

1. **TALINUM** Adans. FAME-FLOWER.

Perennial herbs or shrubby plants, ours with fleshy rootstocks. Leaves alternate or nearly opposite, in ours terete. Flowers in terminal cymes, or in some species axillary. Sepals 2, scarious, deciduous. Petals 5 or more, early withering. Stamens usually more numerous than the petals. Ovary superior, styles 3, more or less united. Capsules 1-celled, 3-valved, parchment-like. Seeds flattened, reniform, shining.

Plant scapose, from a corm-like rootstock.

Flowers about 1 cm. wide; stamens 5-10.

Flowers 2-3 cm. wide; stamens 30 or more

Plant low and spreading, from a branched rootstock; flowers axillary.

1. *T. parviflorum*

2. *T. calycinum*

3. *T. brachypodum*

1. ***T. parviflorum*** Nutt. Scape usually 1 dm. high or less; leaves numerous, basal, terete, 2-5 cm. long, glabrous; sepals ovate, 2-3 mm. long; petals rose or whitish, 5-7 mm. long; capsule ellipsoid, 3-4 mm. long. Rocky soil: Minn.—S.D.—Ariz.—Tex.; Mex. *Son.—Plain—Submont.* Jl—Au.

2. ***T. calycinum*** Engelm. Scape 1-2 dm. high; leaves 1-5 cm. long, glabrous; sepals ovate-orbicular, 5 mm. long, tardily deciduous; petals 8-10, pink, 10-12 mm. long; capsule subglobose, 6-7 mm. long. Sandy soil: Ark.—Mo.—Neb.—N.M.; Mex. *Plain—Son.* Je—S.

3. ***T. brachypodum*** S. Wats. Lower leaves scale-like, the others linear, fleshy, 5-12 mm. long; pedicels very short, 2-5 mm. long, articulate below; sepals ovate, acutish, 4-5 mm. long; petals bright pink, 8-10 mm. long; stamens 10; capsule ovate, 4 mm. long. Barren hills and mcsas: s Utah—N.M.—Ariz *Son.* Jl—Au.

2. **CLAYTONIA** (Gronov.) L. SPRING BEAUTY, GROUND-NUT.

Perennial fleshy herbs, with tuber-like corms or a thick fleshy root and short caudex. Basal leaves solitary or few, or clustered on the caudex; stem-leaves

either 2, opposite, or a few alternate. Flowers in terminal racemes. Sepals 2, persistent. Petals 5. Stamens 5, adnate to the petals at the base. Ovary superior; styles 3, mostly united. Capsule 1-celled, 3-valved.

Plants with corms, basal leaves few.

Stem-leaves linear or narrowly lanceolate, 1-ribbed or indistinctly 3-ribbed.

Corolla orange

Corolla white or pink

Sepals oblong to oval, rounded at the apex; corms usually with 1 or 2 stems.

Stem-leaves petioled; corolla white, with rose-colored veins.

Stem-leaves sessile, flowers pink

Sepals rhombic-ovate, corms with several stems.

Stem-leaves broadly lanceolate, distinctly triple-ribbed.

Plants with a short caudex and a fleshy taproot; basal leaves clustered.

1 *C. chrysantha*.

2 *C. virginica*

3 *C. rosea*.

4 *C. multiscapa*.

5 *C. lanceolata*

6 *C. megarrhiza*.

1. *C. chrysantha* Greene. Corm 1-1.5 cm thick, globose; basal leaves usually solitary; blades narrowly oblong or oblanceolate; stem 1-2 dm. high; stem-leaves sessile, inserted below the middle of the stem; sepals rhomboidal or suboval, scarious-margined; petals 8-10 mm. long, broadly oval. *C. aurea* A. Nels., not O. Kuntze. Wet flats: Ida.—Wash.—B.C. *Mont.*—*Subalp.* Je.

2. *C. virginica* L. Corm globose, 1-2 cm. in diameter; stems 1-2.5 dm. high; basal leaves usually several; blades linear or narrowly linear-lanceolate, 5-12 cm long; sepals 5-7 mm. long, acute or obtuse; petals oblong, 8-10 mm. long, white, or in the East often pinkish, with rose-colored veins. Rich woods or among bushes: N.S.—Ga.—Tex.—Colo.—Mont. *Plain*—*Mont.* Mr.—Au.

3. *C. rosea* Rydb. Corm 10-15 mm. in diameter; stem about 1 dm. high, slender; basal leaves rare; blades 1-2 cm. long, spatulate; stem-leaves 2-5 cm. long; sepals rounded-ovate, rounded at the apex, about 5 mm. long; capsule shorter than the sepals. Hills and valleys: Colo.—Utah—Wyo. *Submont.*—*Mont.* My.—Je.

4. *C. multiscapa* Rydb. Corm 1-1.5 cm. thick, globose; stems 5-15 cm. long; basal leaves usually several; blades narrowly oblong or oblanceolate, 3-5 cm long; stem-leaves sessile, lanceolate, 2-4 cm. long, at the middle of the stem; petals broadly elliptic or oval, 7-10 mm. long, white, with purplish veins. *C. multicaulis* A. Nels., not O. Kuntze. Gravelly slopes and bottom lands: Mont.—Wyo.; apparently also Ia. *Plain*—*Submont.* My.—Jl.

5. *C. lanceolata* Pursh. Corm about 1 cm. thick; stem 0.5-2 dm. high; basal leaves solitary; blade oblong-lanceolate; stem-leaves sessile, 2-5 cm. long; sepals elliptic, 3-6 mm. long, acute or obtuse; petals obovate, from rounded to obcordate at the apex, rose-colored, with purple veins. Rich wet soil: Sask.—N.M.—Calif.—B.C. *Submont*—*Subalp.* Ap.—Jl.

6. *C. megarrhiza* (A. Gray) Parry. Root 1-4 cm. thick; basal leaf-blades spatulate to nearly orbicular, with the wing-margined petioles 2-15 cm. long, fleshy; stem-leaves alternate, linear or narrowly spatulate; sepals ovate, acute, 5-6 mm. long; petals pink or white, purple-veined, 6-8 mm. long. Rock-slides, in the higher mountains: Mont.—N.M.—Utah—Wash. *Mont.*—*Alp.* Jl.—Au.

3. *LIMNIA* L. SPANISH LETTUCE, SQUAW LETTUCE, SQUAW CABBAGE, MINERS' LETTUCE.

Annuals, or perennials, with slender rootstocks, rarely stoloniferous or bulbiferous in the basal leaf-axils. Basal leaves several; stem-leaves opposite, a single pair, often more or less united. Inflorescence racemose. Sepals 2, somewhat unequal, persistent; petals 5, emarginate or obcordate. Stamens 5, opposite the petals. Styles 3. Capsule 3-valved from the apex; seeds 2-3.

Plants with perennial scaly rootstocks; stem-leaves not united.

1 *L. asarifolia*.

Plants annual, or perennial by offsets

Stem-leaves free; bractlets present

Stem-leaves rounded or rhombic-ovate.

Stem-leaves linear

2. *L. sibirica*

3. *L. arenicola*.

Stem-leaves more or less united, bractlets lacking or only one below the lowest pedicel.

Stem-leaves broadly ovate to orbicular

Blades of the basal leaves reniform or rhombic to spatulate

Racemes elongate; flowers more or less fascicled, seeds about 2 mm. long

4. *L. perfoliata*

- Racemes short, only slightly exceeding the subtending leaves; seeds about 1 mm. long 5 *L. depressa*
 Blades of the basal leaves linear to spatulate; seeds 1 mm. long or less 6 *L. parviflora*
 Racemes elongate 7 *L. utahensis*
 Racemes very short 8 *L. spathulata*
 Stem-leaves 1-2 cm long; seeds minutely muriculate 9 *L. exigua*
 Stem-leaves less than 1 cm long, seeds conspicuously granulated
 Stem-leaves linear

1. *L. asarifolia* (Bong.) Rydb. Stem 2-3 dm high, slender; basal leaves long-petioled; blades reniform to rhombic-ovate, 2-8 cm. long; cauline leaves closely sessile, broadly ovate or rounded; inflorescence bractless; petals white, 6-10 mm. long, obcordate. *Claytonia asarifolia* Bong. Springy ground: Mont—Utah—Calif.—Alaska. *Mont.* My—Au.

2. *L. sibirica* (L.) Haw. Annual, or perennial with offsets; stem slender, 1-4 dm. high; basal leaves petioled; blades rhombic-ovate to lanceolate, 2-5 cm long; racemes elongate, lax, usually with linear or oblong bracts; petals rose-colored or white, about 6 mm. long. *C. sibirica* L. Springy places and banks. Mont.—Utah—Calif.—Alaska; Siberia. *Submont.*—*Subalp.* My—Au.

3. *L. arenicola* (Henders) Rydb. Annual; stem 5-15 cm. long; basal leaves petioled; blades narrowly linear-oblancoelate, 2-5 mm. broad, 2-5 cm long; racemes rather many-flowered; petals pinkish, 5-6 mm long, emarginate. *C. arenicola* Henders. Sandy river banks and in pine woods: Wash—Ida. *Son.*—*Submont.* Ap—My.

4. *L. perfoliata* (Donn) Haw. Annual; stem 1-3 dm high; basal leaves petioled; blades 2-7 cm wide; stem-leaves connate into a rounded, 2-lobed cup; sepals orbicular, in fruit 4 mm. long; petals white, slightly longer than the calyx; seeds minutely granulate. *C. perfoliata* Donn. Banks and springy places. Mont.—Utah—Calif.—Alaska. *Submont.*—*Mont.* Mr—Je.

5. *L. depressa* (A Gray) Rydb. Annual; stem 5-10 cm long; leaf-blades 5-15 mm. wide, stem-leaves connate, but usually less so on one side; calyx about 2 mm. long; pedicels 3-4 mm. long. *C. parviflora depressa* A Gray. *Monta Viea* A. Nels. Banks and springy places: S D.—Colo.—Ariz—Calif.—B C *Submont.* My—Jl.

6. *L. parviflora* (Dougl.) Rydb. Annual; stem 1-2 dm. high, slender, stem-leaves connate, forming a rounded disk, with 2 short-acuminate lobes, pedicels in fruit usually much longer than the calyx; petals pink or white; seeds scarcely granulate. *C. parviflora* Dougl. Banks and springy places: Ida—Utah—Calif.—B C. *Submont.*—*Son.* Ja—Je.

7. *L. utahensis* Rydb. Annual; stem 2-15 cm. long; basal leaves petioled, blades spatulate to linear, 1-3 cm long, 2-6 mm. wide; stem-leaves connate, forming an oblique, 2-lobed disk, 1-2 cm broad; inflorescence corymbiform; sepals ovate, equalling the pedicels; seed 1 mm. in diameter. Sandy soil: s Utah. *Son.*

8. *L. spathulata* (Dougl.) Heller. Annual; stem 2-10 cm long; basal leaves 2-3 cm long; stem-leaves ovate to lanceolate, connate on one side, 4-8 mm long; inflorescence short and corymbiform; petals white, 3-4 mm. long. Hillsides and saline ground: B.C.—Calif.—Utah. *Son.*—*Submont.* Ap—Je.

9. *L. exigua* (T. & G.) Heller. Annual; stems several, 2-8 cm. high; basal leaves linear or linear-oblancoelate, 2-4 cm. long, stem-leaves connate on one side, 1-2 cm. long; petals white, obcordate, twice as long as the sepals; seeds minutely muricate. *C. exigua* T. & G. Hills: B.C.—Ida.—Calif. *Son.* Ap—Je

4. *CRUNOCALLIS* Rydb. WATER SPRING-BEAUTY.

Floating or creeping perennials, rooting at the nodes, usually flagelliferous; bearing winter buds at the ends of the flagella. Leaves opposite, several pairs. Inflorescence racemose. Sepals 2. Petals 5, equal. Styles 3; ovules 3. Capsule 3-valved; seeds 2-3, round-reniform, muriculate.

1. *C. Chamissonis* (Ledeb.) Rydb. Perennial; leaves spatulate or oblancoelate, 1-4 cm. long; raceme 1-9-flowered; pedicels recurved in fruit; petals pale

rose-color, 6-8 mm. long; seeds densely muricate. *Claytonia Chamissoi* Ledeb. *Montia Chamissonis* Greene. Wet places and in springs: Alaska—Calif.—N.M.—Minn. *Plain*—Mont. Je—Au.

5. NAIOCRÈNE (T. & G.) Rydb.

Perennials, with very fleshy leaves, decumbent or sarmentose, producing axillary bulblets. Stem-leaves numerous, alternate. Inflorescence racemose. Sepals 2, broadly obovate, unequal. Petals 5. Stamens 5, adnate to the base of the petals. Styles 3; ovules 3. Capsule 3-valved, usually 3-seeded.

1. *N. parviflora* (Moq.) Rydb. Perennial, with a rootstock; stems several, ascending or decumbent at the base, 1-3 dm. high; leaves fleshy, the lower petioled, the blades spatulate, 5-20 mm. long, the upper sessile, oblong and bract-like; petals obovate or obcordate, 8-10 mm. long, rose-colored or white. *Claytonia parviflora* Moq. *Montia parviflora* Greene. Moist rocks: Alaska—Mont.—Calif. *Submont.*—Mont. My—Au.

6. MONTIÁSTRUM (A. Gray) Rydb.

Leafy-stemmed annuals, with narrow, alternate leaves, partly searious at their insertion. Inflorescence racemose, secund. Sepals 2. Petals 5, obviously unequal, unguiculate at their bases. Stamens 3. Styles 3. Capsule 3-valved, 2-3-seeded. Seeds lenticular, thin-edged, very shining.

1. *M. lineare* (Dougl.) Rydb. Annual; stems branched at the base, slender, erect, 0.5-3 dm. high; leaves linear-filiform, 1-5 cm. long; sepals in fruit 3-4 mm. long, rounded; seeds 2 mm. in diameter, black and shining. *Claytonia linearis* Dougl. *Montia linearis* Greene. Moist ground: Mont—Calif.—B.C. *Submont.* Ap—Je.

7. LEWÍSIA Pursh. BITTER-ROOT, RED-HEAD LOUISA.

Low acaulescent, succulent perennials, with a thick fleshy taproot. Scapes 1-flowered, jointed near the middle and with a whorl of 2 or more subulate bracts at the joint. Sepals 6-8, distinct, marcescent-persistent. Petal 8-16, large and showy. Stamens numerous. Styles 5-8, united at the base. Capsule circumscissile at the base, then bursting irregularly, many-seeded. Seeds black and shining. Cotyledons accumbent.

1. *L. rediviva* Pursh. Leaves numerous, terete or nearly so, more or less clavate, 1-4 cm. long; involucre of 5-7 subulate, scarious bracts; sepals 6-8, strongly imbricated, rounded-oval; petals 12-16, rose-colored, purplish, or rarely white, oval or spatulate, 1.5-3 cm. long; stamens about 40. Stony ridges: Mont.—Colo.—Ariz.—Calif.—B.C. *Submont.*—*Subalp.* Ap—Je.

8. OREOBRÒMA Howell. BREAD-ROOT.

Low acaulescent perennials, with fleshy taproots, with or without a multicapital caudex. Leaves tufted at the base, fleshy. Scapes few-many-flowered. Sepals 2. Petals 3-10 or more. Stamens 5-20, usually not of the same number as the petals. Styles 2-7. Capsules membranous, circumscissile at the base, many-seeded. Cotyledons incumbent. [*Calandrinia* A. Gray, in part.]

Bracts neither sepal-like nor closely subtending the calyx

Sepals not erose-denticulate

Petals 10-12 mm. long, leaves usually more than 2 mm. wide

Petals less than 10 mm. long; leaves 2 mm. wide or less.

Sepals erose-denticulate

Bracts 2, sepal-like and closely subtending the calyx.

1. *O. nevadensis*.

2. *O. minima*

3. *O. pygmaea*.

4. *O. brachycalyx*.

1. *O. nevadensis* (A. Gray) Howell. Root fusiform, 1-3 cm. long; leaves linear, 5-10 cm. long; scape stout, 4-10 cm. long; bracts lanceolate, near the base of the scape; sepals rounded-ovate, in fruit 1 cm. long; petals white, 10-12 mm. long. *C. nevadensis* A. Gray. Mountains: Wash.—Colo.—N.M.—Calif. *Submont.*—Mont. Je—Jl.

2. *O. minima* A. Nels. Root napiform, 5-20 mm. long; leaves several, narrowly linear, 4-7 cm. long; scape rarely equalling the leaves; bracts one-third

from the base, lanceolate; sepals oval, abruptly acuminate; petals white. *Lewisia minima* A. Nels. Creek banks: n Wyo.—Mont.—Ida. *Submont.* Jl.

3. *O. pygmaea* (A. Gray) Howell. Root usually elongated-conic, 2–8 cm. long; leaves many, narrowly linear, 2–7 cm. long; scape 2–5 cm. high; bracts scarious, lanceolate, inserted at the middle of the scape; sepals rounded-ovate, short-acuminate; petals 6–8, pink or white, 8–10 mm. long. *C. pygmaea* A. Gray *O. Gray* (Britt.) Rydb. Gravelly hills and mountain sides: Mont.—Colo.—Calif.—Wash. *Mont*—*Alp.* Je—Au.

4. *O. brachycalyx* (Engelm.) Howell. Leaves spatulate or oblanceolate, spreading, 3–7 cm. long, contracted into a margined petiole; scape 2–5 cm. long; bracts elliptic, about 6 mm. long, equalling the oval sepals; petals 7–9, cuneate or obovate, white, 1–2 cm. long; stamens 10–15. *C. brachycalyx* Engelm. Mountains: s Utah—N.M.—s Calif. Ap—Je.

9. *EROCÁLLIS* Rydb.

Perennial, with globular corms. Radical leaf usually solitary, not present at flowering time. Stem low, with 2 or 3 whorled leaf-like bracts. Sepals 2, somewhat unequal. Petals 3–10, oblong. Capsule oblong-conical, circumscissile.

1. *E. triphylla* (S. Wats.) Rydb. Corm globose, 5–8 mm. thick; stem 2–10 cm. high, slender; basal leaves solitary or none; stem-leaves 2–4, verticillate, linear-filiform, 1–5 cm. long; inflorescence 2–20-flowered; petals 3–10, oblong, 4 mm. long. *Claytonia triphylla* S. Wats. *Lewisia triphylla* B. L. Robins. Mountains: Wyo.—Colo.—Calif.—Wash. *Mont.* Je—Au.

10. *SPRAGUEA* Torr. PUSSY-PAWS.

Biennial or perennial herbs, with rosulate leaves. Flowers in dense scorpioid spikes clustered in an umbel-like or subcapitate inflorescence. Sepals 2, orbicular, scarious-hyaline, accrescent and persistent. Petals 4, somewhat unequal. Stamens 3, opposite to the three larger petals. Ovary 8–10-ovuled. Styles 2, united to near the apex. Capsule 2-valved, membranous. Seeds black, shining.

1. *S. multiceps* Howell. Perennial, with a caespitose caudex, forming cushions; basal leaves numerous, petioled; blades spatulate, fleshy, 0.5–5 cm. long; flowering stems scape-like, 3–15 cm. long; stem-leaves small, oblanceolate, flowers in a dense head-like inflorescence; sepals with broad, scarious, white or pink margins, orbicular or somewhat reniform, in fruit 7–8 mm. broad. Volcanic sand and geyser formations: Wash.—Mont.—Wyo. *Mont.*—*Alp.* Je—Au.

11. *PORTULACA* (Tourn.) L. PURSLANE, PUSSLEY.

Annual or perennial fleshy herbs, mostly with diffusely branched stems. Leaves terete or flat, opposite or alternate, with bristle-like or scarious stipules. Sepals 2, deciduous. Petals 4–6, fugaceous. Stamens 8 or more. Ovary partly or wholly inferior; styles 3–8, slender. Capsule 1-celled, circumscissile. Seeds flattened, reniform.

Leaf-blades flat, glabrous in the axils or nearly so; petals yellow.

Stem prostrate, sepals pointed in the bud, seeds obscurely granulate. 1. *P. oleracea*
Stem ascending; sepals obtuse in the bud, seeds echinate-tuberculate. 2. *P. retusa*

Leaf-blades terete or nearly so, pilose in the axils, petals red or purple. 3. *P. pilosa*

1. *P. oleracea* L. Annual; stem diffusely branched at the base, prostrate, 1–6 dm. long; leaves fleshy, sessile or nearly so, cuneate or obovate, 1–3 cm. long, rounded at the apex; buds flattened; stamens 7–12. Cultivated grounds and waste places: Me.—Fla.—N.M.—Wash.; Mex. and W. Ind.; nat. from the Old World. *Plain.* Ja—D.

2. *P. retusa* Engelm. Annual; stem ascending, branched near the base; leaves cuneate, 1–2.5 cm. long, often retuse, fleshy, sessile, sepals carinately-winged; petals minute; stamens 10–19. Sandy soil: Ark.—Utah—N.M. *Son.*—*Submont.* Jl—S

3. *P. pilosa* L. Annual; stem ascending, branched; leaves nearly terete, linear or linear-subulate, 1 cm. long or less, with numerous hairs in the axils; petals carmine to purple, 3–4 mm. long, retuse; capsule globose. Sandy soil. Fla.—Mo.—Colo.—Calif.; Trop. *strat*—*Son.* Au—Am

FAMILY 43. **CORRIGIOLACEAE.** WHITLOW-WORT FAMILY.

Herbs, with narrow opposite leaves with scarious stipules. Flowers perfect, inconspicuous, in dichotomous cymes. Sepals 4-5, distinct or partly united. Corolla wanting. Stamens 4 or 5. Pistil solitary; ovary 1-celled. Fruit a utricle or an achene.

1. **PARONYCHIA** (Tourn.) Adans. WHITLOW-WORT.

Annual or perennial herbs, with stems often branched at the base. Leaves opposite, narrow. Sepals 5, narrow, concave or hooded at the awn-tipped apex. Stamens 5, included; filaments inserted at the base of the ovary, alternating with 5 small staminodia. Styles partially united. Utricle included. Radicle ascending.

- Flowers solitary, leaves scarcely exceeding the bracts, plants densely pulvinate
 Leaves elliptic, thick, not spinulose-tipped 1 *P. pulvinata*
 Leaves linear, chartaceous, spinulose-tipped 2 *P. brevicuspis*.
 Leaves straight, ascending, spinules of the sepals less than 1 mm. long.
 Leaves arcuate-spreading, spinules of the sepals more than 1 mm. long 3. *P. sessiliflora*
- Flowers more or less clustered, leaves much longer than the bracts
 Plants low and diffuse, less than 1 dm. high, calyx fully 3 mm. long 4 *P. depressa*
 Inflorescence much contracted, bracts exceeding the flowers.
 Inflorescence more open; bracts shorter than or merely equalling the flowers. 5 *P. diffusa*.
- Plants taller, 1 dm. or more high; stems erect or ascending, calyx 2-2.5 mm. long
 Branches of the cymes ascending, calyx about 2.5 mm. long, sepals lanceolate, gradually acuminate 6 *P. Jamesii*
 Branches of the cymes divaricate; calyx about 2 mm. long, sepals oblong, abruptly acuminate. 7. *P. Wardii*.

1. ***P. pulvinata*** A. Gray. Pulvinate-cespitose perennial, 3-5 cm. high; stipules ovate, silvery; leaves thick, 3-5 mm. long; flowers solitary in the upper axils; sepals broadly scarious-margined, ovate, about 3 mm. long. Exposed mountain tops: N.M.—Wyo.—Utah. *Subalp.—Alp.* Jl—Au.

2. ***P. brevicuspis*** (A. Nels.) Rydb. Pulvinate-cespitose perennial; leaves 3-5 mm. long, linear, with short spine-tips; flowers sessile in the upper axils; sepals 2-3 mm. long, brown, scarcely scarious-margined. *P. sessilifolia brevicuspis* A. Nels. Dry hills: Wyo.—Colo.—Nev. *Submont.* Jl.

3. ***P. sessiliflora*** Nutt. Pulvinate-cespitose perennial, 4-10 cm. high; leaves linear or linear-subulate, spinulose-tipped, 4-6 mm. long; sepals lanceolate brown with narrow scarious margins, spine-tipped, about 3 mm. long. Dry ridges: Sask—Tex—Utah—Alta. *Plain—Mont.* Je—Au.

4. ***P. depressa*** Nutt. Cespitose perennial, somewhat woody at the base; stems diffuse, much branched; leaves linear, 5-8 mm. long, scarious, spinulose-tipped; sepals linear, 2.5-3 mm. long, usually exceeded by the bracts. Dry hills or plains: S.D.—Neb.—Wyo. *Plain—Submont.* Je—Au.

5. ***P. diffusa*** A. Nels. Cespitose perennial, somewhat woody at the base; stems 5-15 cm. long; leaves linear, 7-10 mm. long, spinulose-tipped, scarious; sepals linear, 2.5-3 mm. long; spine-tips 0.5 mm. long. Dry plains, hills, and mountains: S.D.—Kans.—Colo.—Wyo.—Alta. *Plain—Alp.* Je—S.

6. ***P. Jamesii*** T. & G. Perennial, shrubby and branched at the base; stems erect, 1-3 dm. high, forking above; leaves strongly ascending, 1-2 cm. long, callous-mucronate; sepals about 2.5 mm. long, lanceolate; spine-tips strongly ascending. Dry plains and hills: Neb.—Tex.—N.M.—Wyo. *Plain—Mont.* Je—Au.

7. ***P. Wardii*** Rydb. Perennial, shrubby and branched at the base; stems erect, 1-2 dm. high; leaves narrowly linear or linear-filiform, 0.7-2 cm. long, early deciduous, mucronate, minutely scarious. Dry stony soil: Kans.—Tex.—N.M.—Colo. *Plain—Submont.* Jl—O.

FAMILY 44. **ALSINACEAE.** CHICKWEED FAMILY.

Herbs with opposite leaves, with or without stipules. Flowers perfect, usually cymose. Sepals 4 or 5, distinct. Petals 4 or 5, clawless, rarely wanting. Stamens twice as many as the sepals or fewer. Gynoecium of 2-5 united carpels; ovary partly or completely 2-5-celled; styles 2-5. Fruit a capsule, opening with as many or twice as many valves as carpels. Seed several to many on a central placenta. Embryo curved.

Stipules wanting.

Capsule opening with twice as many valves or teeth as there are styles, petals deeply 2-cleft

Capsule short, ovate or oblong, opening with usually 6 valves; styles usually 3

Capsule long, cylindric, often curved, opening with usually 10 teeth at the apex, styles usually 5.

Capsule opening with as many, entire or at length 2-cleft, valves as there are styles, petals entire or merely notched at the apex (except in *Arenaria Kingii*)

Styles fewer than the sepals, or rarely of the same number and then opposite them

Flowers with a rather prominent, glandular, 10-lobed disk under the ovary, plants fleshy

Flowers with no or a very inconspicuous disk; plants scarcely fleshy

Seeds with a basal membranous appendage (strophiole) at the hilum

Seeds not strophiolate.

Valves of the capsule entire.

Valves of the capsule at last 2-cleft.

Styles as many as the sepals and alternate with them.

Stipules present

Leaves whorled, styles 5.

Leaves opposite, styles usually 3.

Styles distinct, sepals not spinulose-tipped.

Stigmas sessile; sepals spinulose-tipped.

1. ALSINE.

2. CERASTIUM

3. AMMODENIA

4. MOEHRINGIA

5. ALSINOPSIS

6. ARENARIA.

7. SAGINA.

8. SPERGULA.

9. TISSA

10. LOEFLINGIA

1. **ALSINE** L. CHICKWEED, STARWORT.

Annual or perennial herbs, with weak spreading stems and alternate leaves. Flowers usually in open cymes. Sepals 5, rarely 4. Petals 5 or 4, deeply 2-cleft, or rarely wanting. Stamens 10 or fewer, hypogynous. Ovary 1-celled; styles 3, rarely 4 or 5, opposite the sepals, if of the same number. Capsule relatively short, opening by twice as many valves as there are styles. Seeds flattened or globose. [*Stellaria* L.]

Plant not viscid.

Basal leaf-blades spatulate to rhombic-obovate, petioled; plants annual.

Leaf-blades all ovate or rhombic-ovate

Flowers cymose

Flowers solitary in the axils.

Stem-leaves small, lanceolate

All leaves sessile

Upper bracts at least scarious, perennials with rootstocks.

Petals minute or none.

Leaves oblong-lanceolate; branches of the inflorescence at last reflexed

Leaves linear; branches of the inflorescence ascending.

Petals equalling or exceeding the sepals.

Leaves broadest at about the middle, narrowed at the base.

Leaves broadest near the base.

Calyx 4-5 mm long, stem not villous

Stem 2-3 dm high, many-flowered, leaves narrowly lanceolate to

nearly linear.

Sepals lanceolate, very acute, nearly equalling the capsule

Sepals ovate or ovate-lanceolate, obtuse or mucronate, scarcely more than half as long as the mature capsule, pedicels in fruit spreading.

Stem 3-15 cm. high, usually 1-3-flowered, rarely 4-6-flowered

Leaves narrowly lanceolate; sepals lanceolate, very acute

Leaves ovate or ovate-lanceolate; sepals ovate-lanceolate, ob-

tusish.

Calyx 2-3 mm long; stem 1 dm. high or less, 3-10-flowered, usually

villous.

6. *A. strictiflora*

7. *A. longipes*

8. *A. laeta*

9. *A. Edwardsii*

10. *A. subvestita*

1. *A. media*

18. *A. washingtoniana*

2. *A. nitens*

3. *A. batcalensis*

4. *A. alpestris*

5. *A. longifolia*

- None of the bracts scarious
 Leaves linear to lanceolate, more than four times as long as broad; plants perennial, with running rootstocks.
 Petals equalling or exceeding the sepals
 Plant low, less than 1 dm. high, bluish green 8. *A. laeta*.
 Plant slender, light green, more than 1 dm. high 11. *A. crassifolia*.
 Petals much shorter than the sepals, or none.
 Sepals with narrow scarious margins, acute; leaves oblong-lanceolate, narrowed at the base; midrib not unusually strong, petals usually lacking 12. *A. borealis*.
 Sepals with broad scarious margins, acuminate, leaves linear-lanceolate, with a strong midrib, petals usually present.
 Leaves 2-8 mm. wide, broadest near the base 13. *A. brachypetala*.
 Leaves 8-15 mm. wide, broadest near the middle. 14. *A. oxyphylla*.
 Leaves ovate-lanceolate, ovate or oval, less than four times as long as broad; caespitose perennials, except No. 18
 Leaves thin
 Stem glabrous or nearly so 15. *A. crispa*.
 Sepals acute or acuminate. 16. *A. obtusa*.
 Sepals obtuse
 Stem distinctly pubescent
 Leaves sessile; flowers more or less cymose. 17. *A. calycantha*.
 Leaves short-petioled, flowers solitary in the axils. 18. *A. washingtoniana*.
 Leaves thick
 Petals equalling or exceeding the sepals, branches simple, ascending
 Leaves ovate, bluish green, with strong midrib; petals longer than the obtusish sepals 9. *A. Edwardsii*.
 Leaves oval, bright green, midrib not strong; petals equalling the acute sepals 19. *A. Palmeri*.
 Petals shorter than the sepals, branches divaricately branched, spreading 20. *A. polygonoides*.
 Plant more or less viscid, especially the upper portion; perennials with rootstocks
 Plant tall, 1-3 dm. high, erect, leaves linear to lanceolate. 21. *A. Curtisi*.
 Leaves linear or linear-lanceolate, 2-5 mm. wide. 22. *A. Jamesiana*.
 Leaves lanceolate, 5-10 mm. wide 23. *A. americana*.
 Plant low, diffusely caespitose, leaves ovate.

1. *A. media* L. Stem diffusely branched, prostrate or ascending, 1-4 dm. long, glabrous except the pubescent lines; leaf-blades 0.5-3.5 cm. long; sepals oblong, glandular-pubescent, about equalling the capsule; petals shorter than the sepals. *S. media* Cyrill. CHICKWEED. Waste places, cultivated grounds, etc.: Greenl.—Fla.—Calif.—B.C.; W. Ind.; nat. from Eu. Ja-D.

2. *A. nitens* (Nutt.) Greene. Stem branched near the base, glabrous or somewhat pubescent below, erect, 1-2 dm. high; basal leaf-blades ovate, acute, 4-5 mm. long; stem-leaves 6-10 mm. long; sepals lanceolate, acute, 3-4 mm. long, 3-nerved at the base; petals about half as long as the sepals, or sometimes wanting. *S. nitens* Nutt. *S. praecox* A. Nels. Wet places: w Mont.—Utah—Calif—B.C. Son.—Submont. Mr-Je.

3. *A. baicalensis* Coville. Stem weak, ascending, or decumbent at the base, 3-30 cm. high; leaves 6-20 mm. long; bracts lanceolate; sepals 2-2.5 mm. long, glabrous, scarious-margined. *S. umbellata* Turcz. Around springs and brooks: Mont.—N.M.—Calif.—Ore; Siberia. Submont.—Alp. Jl-Au.

4. *A. alpestris* (Fries) Rydb. Stem 2-4 dm. high, angled; leaves sessile, linear, 2-4 cm. long, 2-4 mm. wide; bracts lanceolate, the lower foliaceous; sepals lanceolate, about 3 mm. long, very acute; petals about half as long or less, or lacking. *S. alpestris* Fries. Wet places: Ont.—Sask.—Colo.—Utah—Alta.; n Eu. Submont.—Mont. Je-Au.

5. *A. longifolia* (Muhl.) Britton. Stem sharply 4-angled, 2-5 dm. high; leaves sessile, lance-linear, often ciliate towards the base, 2-6 cm. long, 2-6 mm. wide, bracts lanceolate; branches of the cyme and pedicels spreading; sepals lanceolate, acute, 3-nerved, about 3 mm. long, shorter than the petals. *S. longifolia* Muhl. Low meadows and swamps: Lab.—Newf.—Md.—N.M.—Alaska; Eurasia. Plan—Subalp. My-Au.

6. *A. strictiflora* Rydb. Stem 2-5 dm. high, angled; leaves linear-lanceolate, 2-4 cm. long, 2-4 mm. wide, spreading; pedicels strongly ascending or

almost erect; calyx 4-5 mm. long; sepals narrowly scarious-margined; petals 5-6 mm. long. *Stellaria stricta* Richards. *S. longipes* Am. auth., not Goldie Wet meadows: w Ont.—Colo.—Calif.—B.C. Plain—Subalp. My—Au.

7. *A. longipes* (Goldie) Coville. Stem much branched, 4-angled, 1-3 dm. high; leaves linear-lanceolate, 1-3 cm. long, glabrous, rather firm, shining, pedicels 2-5 cm. long; calyx 4-5 mm. long; sepals broadly scarious-margined, petals slightly exceeding the sepals. *S. longipes* Goldie. *S. valida* Goodding Wet places: Greenl.—Que.—Colo.—Calif.—Alaska. Submont.—Mont. Jl—Au

8. *A. laeta* (Richards.) Rydb. Stem 5-15, rarely 20 cm. long, densely leafy; leaves 1-2 cm. long, 2-4 mm. wide, bluish green, sometimes glaucous, shining, bracts foliaceous, or (in several flowered plants) the upper scarious; pedicels erect; sepals narrowly lanceolate, very acute, almost equalling the capsule, petals about 5 mm. long. Wet places in the mountains: Hudson Bay—N.M.—Calif.—Alaska—Arctic Sea. Mont.—Alp. My—Au.

9. *A. Edwardsii* (R. Br.) Rydb. Stem 3-10 cm. high, glabrous or somewhat pubescent; leaves 3-10 mm. long, crowded, thick and keeled; bracts all foliaceous or the upper with scarious margins; calyx about 4 mm. long; sepals 3-nerved, with narrow scarious margins; petals 5-6 mm. long. *S. Edwardsii* R. Br. Arctic-alpine situations: Greenl.—Lab.—Hudson Bay—B.C.—Alaska. Subalp.—Alp. Jl—Au.

10. *A. subvestita* (Greene) Rydb. Stem branched at the base, 5-10 cm. high, usually somewhat pilose; leaves numerous, linear-lanceolate, firm, 8-15 mm. long, 1-nerved; bracts ovate, scarious; calyx 2-3 mm. long; sepals ovate-lanceolate, usually obtuse, scarious-margined, slightly shorter than the petals and capsule. *S. subvestita* Greene. Open places: Hudson Bay—Alta.—B.C.—Alaska. Subalp.—Boreal. Je—Jl.

11. *A. crassifolia* (Ehrh.) Britton. Stem weak, ascending, with short internodes, 2-4 dm. long; leaves small, 6-20 mm. long, lanceolate or oblong-lanceolate, acutish, cymes few-flowered; sepals ovate-lanceolate, acuminate, about 3 mm. long, exceeded by the petals. *S. crassifolia* Ehrh. Wet ground: Lab.—Pa.—Colo.—Alta. Mont.—Subalp. Je—Au.

12. *A. borealis* (Bigel.) Britton. Stem erect, 1.5-4 dm. high, glabrous or nearly so; leaves 1-4 cm. long; cyme leafy, several-flowered; pedicels often deflexed; sepals ovate-lanceolate, 3-4 mm. long. *S. borealis* Bigel. Wet places Lab.—N.J.—Colo.—Calif.—Alaska. Submont.—Mont. Jl—S.

13. *A. brachypetala* (Bong.) Howell. Stem erect, 3-6 dm. high, sharply 4-angled; leaves linear-lanceolate, broad at the base, 2-6 cm. long; inflorescence leafy; pedicels reflexed in fruit; calyx about 5 mm. long; sepals narrowly lanceolate, very acute, about twice as long as the petals. *S. brachypetala* Bong. Wet places: Mont.—Wyo.—Utah—Calif.—Alaska. Submont.—Mont. My—Au.

14. *A. oxyphylla* (B. L. Robins.) Heller. Stem decumbent and rooting at the base, 3-5 dm. high, glabrous except the pubescent lines; leaves elongate-lanceolate, narrowed at the base, caudate-attenuate, 5-12 cm. long, sparingly ciliate on the margin; pedicels at length deflexed; sepals about 6 mm. long, lanceolate, attenuate, somewhat scarious-margined; petals about two-thirds as long. *S. oxyphylla* B. L. Robins. Wet places: Ida. Submont. Jl.

15. *A. crispa* (Cham. & Schlecht.) Holz. Stems weak, decumbent, 1-3 dm. long; leaves ovate, usually crisp on the margins, 5-20 mm. long, short-acuminate; flowers axillary, solitary; sepals lanceolate, acute, scarious-margined, exceeding the acute capsule; petals minute or none. *S. crispa* Cham. & Schlecht. *A. viridula* Piper is a form with slightly ciliate petioles. Mountains, in wet places. Alta.—Wyo.—Calif.—Alaska. Submont.—Mont. Ap—Jl.

16. *A. obtusa* (Engelm.) Rose. Stems numerous, glabrous, decumbent or prostrate, 5-15 cm. long, angled; leaves ovate, thin, acute, 8-10 mm. long; flowers axillary, solitary; sepals ovate, obtuse, scarcely at all scarious, shorter than the obtuse capsule. *S. obtusa* Engelm. Wet places in the mountains Alta.—Colo.—Utah—Wash.—B.C. Mont. Je—Au.

17. *A. calycantha* (Bong.) Rydb. Stems numerous, decumbent, more or less pubescent; leaves ovate-lanceolate, ciliolate at least at the base, 5–15 mm. long, sepals lanceolate, acute, about equalling the rounded-ovoid or subspheric, obtuse capsule. *S. calycantha* Bong. Wet places in the mountains: Mont.—Colo.—Calif.—Alaska. *Mont.—Alp.* Jl–S.

18. *A. washingtoniana* (B. L. Robins.) Heller. Delicate annual (?); stems decumbent, quite simple, more or less pubescent; leaf-blades ovate, acute, short-petioled, thin, 8–10 mm. long, finely ciliate near the base; peduncles spreading; sepals four, ovate, acute, 2–3 mm. long, slightly scarious-margined; petals none; capsule ovoid. *S. washingtoniana* B. L. Robins. Woods and dry ground: Wash.—Ida. *Submont.—Mont.* Jl–Au.

19. *A. Palmeri* Rydb. Stems spreading, 5 cm. high or less, glabrous; leaves ovate or ovate-lanceolate, 2–5 mm. long, fleshy, acute; cyme 3–5-flowered; sepals lanceolate, 2.5–3 mm. long, acute; petals about equalling the sepals. Valleys: s Utah. *Son.*

20. *A. polygonoides* Greenc. Stem diffuse, 3–10 cm. long; leaves thick, ovate, 6–12 mm. long; cymes several-flowered, with short branches and pedicels; sepals narrowly lanceolate, slightly scarious-margined, 4 mm. long, acute, nearly twice as long as the petals. High mountains: Colo.—Utah. *Subalp.* Jl–Au.

21. *A. Curtisii* Rydb. Stem sharply 4-angled, erect, branched, 2–6 dm. high, glabrous, except in the inflorescence; leaves rounded and half clasping at the base, 3–6 cm. long; sepals about 3 mm. long, thick, ovate-oblong, obtuse or acutish, with a narrow white margin; petals about 7 mm. long. Open woods: Wyo.—Colo.—Ariz.—Nev. *Submont.—Mont.* Je–Au.

22. *A. Jamesiana* (Torr.) Heller. Stem strongly angled, 2–5 dm. high, viscid above; leaves elongate-lanceolate, 5–12 cm. long, broadest near the base; inflorescence leafy; sepals oblong or elliptic, thin, 4–5 mm. long; petals 7–8 mm. long. *S. Jamesiana* Torr. Moist woodlands: Wyo.—Tex.—Calif.—Ida. *Submont.—Mont.* My–Au.

23. *A. americana* (Porter) Rydb. Stems branched, very leafy, 1–2 dm. high, viscid-puberulent; leaves sessile, ovate, obtusish, 1–3 cm. long; cymes very leafy; pedicels short; sepals ovate, obtuse, 3–4 mm. long; petals about 6 mm. long. *S. dichotoma americana* Porter. Rock slides: Mont. *Subalp.* Je–Au.

2. CERASTIUM L. MOUSE-EAR CHICKWEED.

Annual or perennial herbs, with pubescent, often viscid foliage. Leaves opposite. Flowers cymose. Sepals 5, rarely 4. Petals as many, white, 2-cleft. Stamens usually 10. Ovary one-celled; styles as many as the sepals and opposite them, rarely fewer. Capsule cylindric, often curved, opening by 10, rarely 8, tooth-like valves.

Annuals; pod 2–3 times as long as the calyx.

Pedicels in fruit 1–3 times as long as the calyx, straight or nearly so

1. *C. brachypodum*.

Pedicels in fruit 5 times as long as the calyx or longer; strongly curved above

2. *C. nutans*

Perennials or rarely annuals, pods 1–2 times as long as the calyx

Leaves oblong, oval, or ovate, mostly obtuse, or barely acutish.

Petals 1 cm. long or more, fully twice as long as the sepals

Sepals, at least the outer ones, oval, obtuse, scarious-margined at the tip as well as on the sides.

3. *P. pulchellum*

Sepals lanceolate, acute, scarious mostly on the margins only.

Leaves and stem distinctly, although not copiously villous.

4. *C. alpinum*.

Leaves and stem finely pilose.

5. *C. Earlei*.

Petals less than 1 cm. long

Petals much exceeding the sepals.

Leaves thick with a prominent midrib.

Plant tall, 4–5 dm. high, leaves linear-oblong

12. *C. Leiberghii*

Plant low, depressed, less than 1 dm. high; leaves ovate-lanceolate.

18. *C. thermale*.

Leaves thin, midrib not prominent.

Sepals tinged with purple, stem depressed, 1–3-flowered.

6. *C. Beerianum*.

- Sepals light green; plant not depressed, 3-12-flowered
7. *C. variable*.
 Petals scarcely if at all exceeding the sepals; branches erect or ascending
 Plant low and caespitose, leaves rather thick, all subsessile.
8. *C. Buffumae*
 Plant taller and simple; leaves thin, the lower spatulate and with winged petioles.
 9. *C. vulgatum*
- Leaves, at least the lower ones, linear or linear-lanceolate, acute.
 Leaves of the inflorescence short, broadly ovate, the rest linear.
 10. *C. oreophilum*
- Leaves all linear or lanceolate, or rarely linear-oblong
 Inflorescence racemose-cymose, with almost erect branches, as well as the calyx copiously viscid
 11. *C. elongatum*.
- Inflorescence cymose, with ascending or spreading branches.
 Lower leaves linear-oblong, 5-8 mm wide, often obtuse
 12. *C. Leiberghii*
- Leaves linear or linear-lanceolate, usually less than 5 mm wide, all acute or acuminate
 Petals 12-14 mm long, more than twice as long as the sepals.
 13. *C. graminifolium*
- Petals 10 mm long or less, rarely twice as long as the sepals
 Stem villous with reflexed hairs
 Leaves thin and flaccid, those of the sterile shoots and fascicles much narrower than those of the main stem
 14. *C. angustatum*
- Leaves firm, with a thick midrib, all alike or those of the sterile shoots broader
 15. *C. campestre*.
- Stem finely glandular-puberulent
 Leaves thin and soft, all linear or narrowly linear-lanceolate, midrib not prominent
 16. *C. scopulorum*
- Leaves thick and firm, midrib prominent.
 Stem 1 dm high or more, plant green, leaves not coriaceous, acute
 17. *C. strictum*
- Stem depressed, less than 1 dm high; plant yellowish green, leaves coriaceous, the lower often obtuse
 18. *C. thermale*.

1. *C. brachypodium* (Engelm.) B. L. Robins. Annual; stem often branched at the base, finely villous-viscid, 1-3 dm. high; leaves oblanceolate or oblong, obtuse, 1-3 cm. long, viscid-villous, flowers in rather open cymes. Dry sandy soil: S.D.—Mo.—Alta.—Tex.—Ariz.—Ore.; Mex. *Plain—Submont.* Ap-Jl

2. *C. nutans* Raf. Annual; stem often branched at the base, 2-5 dm. high, viscid-villous, leaves oblong or oblong-lanceolate, usually acute, or the lower oblanceolate, 2-7 cm. long; flowers in open cymes; sepals about 4 mm. long, lanceolate; petals slightly longer. *C. longipedunculatum* Muhl. *C. Bakeri* Greenc. Wet places: N.S.—N.C.—Ariz.—Ore.—B.C. *Plain—Mont* My-Au.

3. *C. pulchellum* Rydb. Low decumbent; stems 5-10 cm. long, finely viscid-pubescent; leaves about 1 cm. long and 4 mm. wide, viscid-pubescent on both sides; peduncles 1-1.5 cm. long; petals 10-12 mm. long. Alpine peaks: Colo. *Alp.* Jl.

4. *C. alpinum* L. Caespitose perennial; stems ascending or decumbent at the base, 1-2 dm. high; leaves 5-20 mm. long, obtuse; cymes usually 1-3-flowered, pedicels long, erect; calyx 7-8 mm. long, villous; petals about 1 cm. long. Arctic-alpine situations: Greenl.—Que.—Alta.—Alaska; Eurasia. *Alp.—Subalp.* Je-Au.

5. *C. Earlei* Rydb. Perennial with a rootstock; stems weak, ascending, 2-3 dm. high, viscid-puberulent, branched; leaves obtuse, 1.5-3 cm. long, 3-8 mm. wide; inflorescence open; bracts ovate or ovate-lanceolate, not scarious, pedicels 2-2.5 cm. long; sepals lanceolate, acute, about 5 mm. long; petals not deeply cleft. Wet places among rocks in the mountains: Colo. *Mont.—Subalp.*

6. *C. Beeringianum* Cham. & Schlecht. Depressed caespitose perennial, stems decumbent or ascending, 5-15 cm. high, more or less viscid-puberulent, leaves 5-15 mm. long, more or less viscid-puberulent; cymes 1-3-flowered, sepals 4-5 mm. long, ovate, thick, acute; petals 6-8 mm. long. Mountain summits, among rocks: Alta.—N.M.—Ariz.—Alaska; Gaspé, Que. *Mont.—Alp* Jl-Au.

7. *C. variabile* Goodding. Cespitose perennial; stems many, erect, 15-25 cm. high, viscid-pubescent; leaves from spatulate to oblong or lanceolate, 1-3 cm. long; sepals oblong or lance-oblong, acute, 6-7 mm. long; petals 7-8 mm. long. *C. pilosum* Greene, not Ledeb. Moist places among rocks: Colo.—Utah. *Mont*—*Subalp.* Ap—Au.

8. *C. Buffumae* A. Nels. Cespitose perennial; stems numerous, 7-15 cm. long, glandular-puberulent, leafy; leaves oblong or elliptic, 5-12 mm. long; cymes dense, 3-10-flowered; sepals green, barely scarious-margined at the tips, oblong, obtusish, 4-5 mm. long; petals 6-7 mm. long. Mountains: Wyo.—ne Utah. *Mont.*

9. *C. vulgatum* L. Perennial, cespitose at the base; stems 1-4 dm. high, viscid-pubescent; leaves oblong or elliptic, obtuse, 1-3 cm. long, villous; cymes elongate, bracts foliaceous, at least the lower pedicels exceeding the sepals in fruit, sepals about 5 mm. long, obtuse, scarious-margined; petals about as long. Roadsides and fields: Lab.—Fla.—Ida.—Wash.—Alaska. *Plain.* My—Jl.

10. *C. oreophilum* Greene. Cespitose perennial; stems decumbent at the base, 1-2 dm. high, glandular-pubescent; leaves 1-3 cm. long, viscid-pubescent; cymes many-flowered; calyx about 5 mm. long, glandular; sepals ovate-lanceolate, acute, more or less scarious-margined; petals 8-9 mm. long. Wet places in the mountains: Colo.—nw N.M. *Submont.*—*Subalp.* My—Jl.

11. *C. elongatum* Pursh. Cespitose perennial; stems much branched, decumbent at the base, 2-3 dm. high, short-pubescent with white reflexed hairs below, very glandular above; leaves narrowly linear, rather stiff, with prominent midnerve, 1.5-3 cm. long; sepals 4-5 mm. long, ovate, acute, scarious-margined; petals about 7 mm. long. Hills: *Mont.*—n Wyo.—Wash. *Plain*—*Submont.* Jl—Au.

12. *C. Leibergii* Rydb. Perennial, with a slender branched rootstock; stems simple, 4-5 dm. high, sparingly villous and viscid-puberulent; leaves 2.5-3 cm. long, 6-7 mm. wide, 1-nerved, thin, inflorescence viscid-puberulent; sepals about 5 mm. long, lanceolate, viscid-pubescent; petals scarcely twice as long as the sepals. Open forests: Ida.—*Mont.* *Submont.* Je.

13. *C. graminifolium* Rydb. Perennial, with a slender branched rootstock, stems 3-5 dm. high, densely short-villous and somewhat viscid, erect; leaves 2-3 cm. long, 1-nerved, short viscid-villous, mostly spreading; sepals narrowly lanceolate, viscid-pubescent, only slightly scarious-margined, acute, 5-6 mm. long. Bottom lands: Wash.—*Mont.*—Wyo.—Ore. *Submont.* Ap—Je.

14. *C. angustatum* Greene. Cespitose perennial; stems 2-3 dm. high, erect or ascending; primary leaves of the stem linear-lanceolate or linear, 2-4 cm. long, villous; inflorescence many-flowered, somewhat glandular; sepals about 4 mm. long, lanceolate, acute, light green, only slightly viscid. Hillsides: Man.—S D.—Wyo.—*Mont.* *Plain*—*Submont.* Je—Jl.

15. *C. campestre* Greene. Cespitose perennial; stems decumbent at the base or ascending, 1-2 dm. high; leaves 1-2 cm. long, linear-lanceolate, ascending, or the lower ones oblanceolate; sepals lanceolate, about 5 mm. long; petals about twice as long. Plains and hills: Man.—S D.—Colo.—Yukon. *Plain*—*Submont.*

16. *C. scopulorum* Greene. Cespitose perennial; stems 1-2.5 dm. high; leaves 1.5-2 cm. long, more or less glandular-puberulent; cymes several-flowered; calyx 4-5 mm. long, glandular-puberulent, acute; corolla about twice as long. (?) *C. effusum* Greene. Mountains: Alta.—N.M. *Submont.*—*Mont.* My—Jl.

17. *C. strictum* L. Cespitose perennial; stems decumbent at the base, 1-2 dm. high; leaves 1-2 cm. long, linear-oblong, acute, ascending, glandular-puberulent; cymes 5-15-flowered, rather short; sepals about 5 mm. long, scarious-margined, acute, viscid-puberulent; petals about twice as long. *C. occidentale* Greene. Mountains and dry hills: *Mont.*—S.D.—Colo.—Utah—Wash.—B.C.; Eurasia. *Plain*—*Subalp.* My—Au.

18. *C. thermale* Rydb. Densely cespitose perennial; stem decumbent, 5-12 cm. long, viscid-puberulent; leaves less than 1 cm. long, lanceolate and

acute, or the lower oblong, with very thick midrib, viscid-puberulent; sepals 4 mm. long, ovate, scarious-margined; petals 5 mm. long; capsule slightly curved *C. fuegianum* A. Nels., not Alboff. Geyser basins: nw Wyo. *Mont.* Jl—Au

3. AMMODENIA J. G. Gmel.

Perennial fleshy herbs, growing in saline soil, with broad opposite leaves and rather small flowers solitary and subsessile in the leaf-axils and the forks. Sepals 5. Petals 5, entire. Stamens 8–10. Disk under the ovary prominent, 8–10-lobed, glandular. Styles 3–5. Capsule subglobose, fleshy, 3–5-valved when mature, the valves entire. Seeds numerous, obovate, not strophiolate.

1. *A. oblongifolia* (T. & G.) Rydb. Perennial, with a horizontal rootstock; stems glabrous, 1–6 dm. high, fleshy, simple or sparingly branched; leaves oblong or oblanceolate, acute, 2–3 cm. long; flowers axillary; sepals lance-ovate, acute, 4–5 mm. long; petals oblong-spatulate or oblanceolate, acute, about equalling the sepals. *Honkneya oblongifolia* T. & G. *Arenaria peplodes major* Hook Saline soil: Ore.—Wyo.—Alaska; e Asia. *Submont.* My—Jl.

4. MOEHRINGIA L.

Low perennials, with slender rootstocks. Leaves opposite, sessile or nearly so, soft. Flowers solitary in the axils or in terminal cymes. Sepals and petals 4 or 5. Petals entire. Stamens 8 or 10. Capsule oblong or ellipsoid, at first 3-celled, opening by 3 two-left valves. Seeds few, smooth and shining, appendaged at the hilum by a membranous broad strophiole

Stem terete, leaves oval or elliptic-oblong; sepals obtuse or acutish 1 *M. lateriflora*
Stem angled, leaves lanceolate or oblanceolate, sepals very acute or acuminate 2 *M. macrophylla*.

1. *M. lateriflora* (L.) Fenzl. Stems puberulent, decumbent at least at the base, 1–2 dm. high; leaves obtuse or rounded at the apex, puberulent, ciliate on the margins and ribs, 1–3 cm. long; cymes corymbiform, 1–6-flowered, sepals ovate, 2.5 mm. long; petals obovate, 4–6 mm. long. *Arenaria lateriflora* L. Wet places among bushes: Lab.—N.J.—N.M.—Ore.—Alaska; n Eurasia. *Submont.*—*Mont.* Je—Au.

2. *M. macrophylla* (Hook.) Torr. Stems decumbent at the base, finely puberulent; leaves usually acute or acuminate at both ends, 2–7 cm. long; cymes 1–5-flowered; sepals ovate-lanceolate, about 4 mm. long, usually exceeding the petals. *A. macrophylla* Hook. Wet places among bushes: Lab.—Vt.—n N.M.—Calif.—B.C. *Submont.*—*Subalp.* My—Au.

5. ALSINOPSIS Small. SANDWORT.

Annual or perennial herbs, often tufted. Leaves opposite, without stipules, sometimes fascicled. Flowers in terminal cymes or rarely solitary in the axils. Sepals 5, often thick. Petals 5, white, entire or merely notched. Stamens 10. Ovary 1-celled; styles usually 3. Capsule ovoid, opening with as many entire valves as there are styles. Seeds several or many, not strophiolate. [*Alsiue* Gaertn., not L.]

Annuals

Plant puberulent above, petals exceeding the sepals

1. *A. tenella*

Plant glabrous, petals scarcely equalling the sepals

2. *A. dawsonensis*

Cespitose perennials.

Sepals acute or acuminate

Leaves pungent, arcuate-spreading, sepals 1-nerved or indistinctly 3-nerved

3. *A. occidentalis*

Leaves not pungent, sepals distinctly 3-nerved

Petals 6–8 mm long, much exceeding the sepals

4. *A. macrantha*

Petals small, scarcely equalling the sepals

5. *A. propinqua*

Plant densely glandular-puberulent.

Plant glabrous or nearly so

Leaves 3-nerved, acutish, flat

Leaves linear-subulate, usually over 1 cm long; plant cespitose, but not densely tufted, 3–10 cm high.

6. *A. verna*

Leaves linear-lanceolate, less than 1 cm long; plant densely tufted, about 2 cm. high.

7. *A. quadrivalvis*

Leaves usually 1-nerved, obtuse, more or less triangular in cross-section, fleshy.

8. *A. Rossii*

Sepals obtuse.

Petals equalling or somewhat exceeding the sepals; plant 1-5 cm high.

9 *A. obtusiloba.*

Petals twice as long as the sepals, plant about 1 dm high. 10 *A. laricifolia.*

1. *A. tenella* (Nutt.) Heller. Stem branched from the base, 5-20 cm. high; leaves subulate, often arcuate, 5-10 mm. long; pedicels slender; sepals strongly 3-ribbed, lanceolate, about 3 mm. long. *Arenaria tenella* Nutt. Rocky places: Mont.—Wyo.—Ore.—B.C. Submont. My-Jl.

2. *A. dawsonensis* (Britton) Rydb. Stem branched from the base, 1-3 dm. high, leaves filiform or linear-subulate, 1-2 cm. long; cyme open, with slender pedicels; bracts lanceolate or subulate, green; sepals oblong-lanceolate, acute, 3-nerved, 4 mm. long, petals oblong. Hillsides: Yukon—Alta.—S.D. Submont.—Subalp. Je-Jl.

3. *A. occidentalis* Heller. Stems loosely matted, ascending or erect, glandular throughout, leaves 6-10 mm. long; cymes open, many-flowered, with ascending or spreading branches; sepals lanceolate, 4-5 mm. long, long-attenuate, petals shorter than the sepals. *Arenaria pungens* Nutt., not Clem. *A. Nuttallii* Pax. Dry mountains: Alta.—Wyo.—Utah—Calif.—B.C. Submont.—Mont.

4. *A. macrantha* Rydb. Stem diffusely branched and spreading, perfectly glabrous; branches 1 dm. long or less; leaves subulate-filiform, obtuse, 5-10 mm. long, 1-nerved; sepals lanceolate, 4-5 mm. long, very acute, scarious-margined. Sandy soil in the mountains. Colo. Mont. Jl.

5. *A. propinqua* (Richards.) Rydb. Stems branched from the base, 3-10 cm. high; leaves linear-subulate, flat, 3-nerved, ascending, 5-10 mm. long; cyme open, branches ascending; sepals lanceolate, 3 mm. long; petals about 4 mm. long. *Arenaria propinqua* Richards. *A. aequicaulis* A. Nels. Sandy soil: Hudson Bay—N.M.—Calif.—B.C.—Mack. Submont.—Alp. Jl-Au.

6. *A. verna* (L.) Cockerell. Stems branched from the base, decumbent below, 1 dm. high or less, glabrous, leaves linear-subulate, flat, rather soft; cyme open, 1-3- (rarely 5-) flowered, with slender pedicels; sepals ovate, 3-3.5 mm. long. *Arenaria verna* L. Sandy and rocky places: Greenl.—Que.—Alta.—Alaska; n. Eu. Subalp.—Alp. Jl-Au.

7. *A. quadrivalvis* (R. Br.) Rydb. Stems tufted, 2-5 cm. high; leaves lanceolate, flat, glabrous; flowers usually solitary; sepals lanceolate, scarious-margined, about 3 mm. long. *Arenaria quadrivalvis* R. Br. Arctic-alpine situations: Arctic coast and Colo. Alp. Jl-Au.

8. *A. Rossii* (Richards.) Rydb. Stems tufted, 1-5 cm. high, glabrous; leaves linear, 5-8 mm. long, glabrous; flowers usually solitary; sepals 3 mm. long. *Arenaria Rossii* R. Br. Alpine-arctic situations: Mack.—Colo.—Wash.—Alaska Alp. Je-Au.

9. *A. obtusiloba* Rydb. Caudex much branched, woody; stems decumbent, very leafy below, glandular-pubescent, 1-5 cm. high; leaves subulate, rigid, with a strong midrib, obtusish, 2-6 mm. long; flowers solitary or rarely 2 or 3; sepals elliptic-oblong, 4-5 mm. long, glandular-pubescent, strongly 3-nerved, obtuse; petals spatulate, 6-7 mm. long. *Arenaria obtusa* Torr., not All. *A. sajanensis* B. L. Robins, not Willd. Exposed mountains: Alta.—N.M.—Utah—B.C. Mont.—Alp.

10. *A. laricifolia* (L.) Heller. Stems woody at the base, decumbent below, very leafy; leaves linear-filiform, somewhat pungent, ciliate or glabrous; flowers 1-4 on each branch; sepals oblong, obtuse, 3-nerved, puberulent, 5-6 mm. long. *Arenaria laricifolia* L. Arctic-alpine situations: Mont.—Alaska; also in the Old World. Alp. Jl.

6. *ARENARIA* L. SANDWORT.

More or less diffusely branched annuals or perennials, sometimes woody at the base. Leaves opposite, without stipules, often also fasciculate ones in their

axils. Flowers in open or subcapitate cymes, or solitary in the leaf-axils. Sepals 5, often strongly ribbed. Petals white, entire or notched, in one species 2-cleft, sometimes wanting. Stamens normally 10. Ovary 1-celled; styles 3, rarely 2, or 4 or 5. Capsule globose or oblong, opening by 3 two-cleft valves. Seeds numerous, not strophiolate.

Annuals; leaves ovate, 4–7 mm. long

1. *A. serpyllifolia*

Perennials.

Leaves neither narrowly linear nor pungent

Plant low and spreading, stems less than 1 dm long; leaves ovate-oblong, less than 1 cm long

Sepals obtuse or acute; midrib not very prominent, leaves glabrous

2. *A. cylindrocarpa*

Sepals acuminate, midrib very prominent; leaves puberulent

3. *A. polycaulos*

Plant taller; stems 2–4 dm long, leaves oblong or linear-oblong, more than 1 cm long

4. *A. confusa*

Leaves narrowly linear, more or less rigid and pungent

Sepals ovate or ovate-lanceolate

Inflorescence contracted and head-like

Bracts ovate, not scabrous-clillate, only scarious-margined

5. *A. congesta*

Bracts narrowly lanceolate, scabrous-clillate, wholly scarious, except the midrib.

6. *A. cephaloides*

Inflorescence more open

Sepals obtuse, or some acutish, or apiculate

Plant glabrous

Bracts linear-lanceolate, scarcely scarious-margined

8. *A. nardifolia*

Bracts ovate-lanceolate or ovate, broadly scarious-margined, with green midrib.

9. *A. lithophila*

Plant more or less glandular

Sepals 4–5 mm long, petals about twice as long as the sepals

10. *A. formosa*

Sepals 2–3 mm long, petals half longer than the sepals

11. *A. salmonensis*

Sepals distinctly acute or acuminate

Petals deeply 2-cleft

12. *A. Kingii*

Petals not deeply 2-cleft.

Plant with a caespitose perennial caudex, all bracts usually broadly lanceolate and broadly scarious-margined

Capsule scarcely exceeding the sepals; leaves ascending

Flowers all pedicelled, in open regular cymes; inflorescence more or less glandular

Leaves distinctly pungent; plant sparingly glandular-puberulent

Sepals 4–5 mm. long, plant not densely tufted

13. *A. uintahensis*

Sepals 3 mm long, plant low, densely tufted.

14. *A. compacta*

Leaves more fleshy, not pungent, inflorescence and calyx densely glandular-pubescent.

15. *A. Tweedyi*

Flowers mostly subsessile, in small glomerules at the ends of the branches of the very irregular cymes

16. *A. Burkei*

Capsule almost twice as long as the sepals; leaves spreading.

17. *A. aculeata*

Plant suffrutescent, the perennial portion of the stems often 1–2 dm high, lower bracts subulate, only the upper scarious

18. *A. glabrescens*

Sepals narrowly lanceolate, acuminate

Cymes open, not densely congested

Plant more or less glandular

Branches of the inflorescence long and ascending-spreading; sepals equalling or exceeding the petals

19. *A. lariflora*

Branches of the inflorescence comparatively short and strongly ascending, sepals usually shorter than the petals.

20. *A. Fendleri*

Plant perfectly glabrous

21. *A. Eastwoodiae*

Cymes densely congested, subcapitate

Caudex of numerous procumbent branches covered with dried leaves, sepals long-acuminate, longer than the petals

22. *A. Franklinii*

Caudex multicapital, sepals short-acuminate, shorter than the petals

23. *A. Hookeri*

1. *A. serpyllifolia* L. Stem branched from near the base, decumbent or ascending, 1–3 dm. high, finely puberulent, leaves 4–7 mm long, ovate, acute or acuminate, distinctly 3–5-nerved, the lowest short-petioled, the rest sessile,

sepals acuminate, about 3 mm. long; petals small, scarcely 2 mm. long. Sandy soil. Que.—Fla.—Ore.—B.C.; W. Ind.; nat. from Eu. My-S.

2. *A. cylindrocarpa* Fernald. Stems ascending or spreading, 2-10 cm. long, minutely puberulent; leaves ovate or oblong, 2-6 mm. long, acute; flowers 1-3, pedicels 4-10 mm. long; sepals ovate, 3-4 mm. long, about equalling the petals. *A. ciliata humifusa* B. L. Robins., not Hornem. *A. norvegica* Am. auth., not Gunner. Rich soil: Greenl.—Que.—Alta.—B.C. Subalp.—Alp. Je—Au

3. *A. polycaulos* Rydb. Stems numerous, prostrate or spreading, about 1 dm. long; leaves ovate or ovate-lanceolate, spreading, about 5 mm. long; sepals ovate-lanceolate, 3-4 mm. long; petals 5-6 mm. long, obovate, entire. *A. saxosa* Coult., not A. Gray. Dry hills. N M.—Colo.—Ariz. Mont. Je-Jl.

4. *A. confusa* Rydb. Stems diffuse, slender, branched, 4-6 dm. long, finely puberulent; leaves with a strong midrib, puberulent, 1-2 cm. long; sepals linear-lanceolate, acuminate, about 3 mm. long; petals about three-fourths as long. Sandy soil, especially in cañons: Colo.—N M.—Ariz. Submont.—Subalp. Je-S.

5. *A. congesta* Nutt. Stems somewhat woody at the base, glabrous, 1-3 dm. high; leaves filiform-subulate, 1-6 cm. long, strongly ascending or almost erect, sepals carinate, obscurely 3-nerved, more or less scarious, 4 mm. long; petals oblong, fully twice as long. Dry plains: Mont.—Colo.—Calif.—Wash. Plain—Mont. Je—Au.

6. *A. cephaloidea* Rydb. Stems strict, 2-4 dm. high, glabrous; leaves erect, filiform-subulate, 3-10 cm. long; flowers in dense heads; bracts often 1 cm. long; sepals similar, but broader, 4-5 mm. long; petals oblong, about half longer than the sepals. Hills: Wash.—Ida. Submont. Je-S.

8. *A. nardifolia* Ledeb. Stems decumbent at the base, otherwise erect, 1-3 dm. high; leaves filiform, 2-8 cm. long, those of the stem nearly erect; sepals oval, obtuse, 4-5 mm. long, with scarious, often purple-tinged margins; petals about twice as long. *A. capillaris* Am. auth. Grassy slopes: Alta.—B.C.—Arctic Sea; Siberia. Submont.—Subalp. Jl.

9. *A. lithophila* Rydb. Stems erect, strict, 1-3 dm. high, glabrous; leaves filiform, mostly erect, 2-5 cm. long; sepals oval, 3-4 mm. long, obtuse, scarious-margined, sometimes tinged with brown or purple; petals 4-6 mm. long. *A. subcongesta* Rydb., in part, and var. *lithophila*. Hillsides and rocky ridges: Sask.—Wyo.—Ida. Submont.—Subalp. My-Jl.

10. *A. formosa* Fischer. Stems somewhat woody at the base, erect, or decumbent at the base, 1-2 dm. high; leaves filiform, mostly erect, 2-7 cm. long; bracts lanceolate, more or less scarious-margined; sepals oval, obtuse, with scarious or more or less colored margins; petals 6-9 mm. long. *A. capillaris* Am. auth. Mountains and hills. Alta.—Utah—Calif.—B.C. Submont.—Mont. Je—Au.

11. *A. salomonensis* Henderson. Stems more or less woody at the base, 6-10 cm. high; leaves filiform, 1-3 cm. long, glabrous or scarious-ciliate; bracts scarious, ovate; sepals 2-3 mm. long, ovate, obtuse, scarious-margined. Dry plains and ridges: Mont.—Ida.—Ore.—Wash. Submont.—Subalp. Jl—Au

12. *A. Kingii* (S. Wats.) M. E. Jones. Stems somewhat woody and glabrous below, glandular above; leaves subulate, ascending-spreading, 1-3 cm. long, often scarious-ciliate; bracts ovate, scarious; sepals lanceolate, acute, about 4 mm. long, glandular-puberulent, scarious-margined; petals about 5 mm. long. Mountains: Nev.—Utah. Mont. Je-Jl.

13. *A. uintahensis* A. Nels. Stems decumbent at the base, 1-2 dm. high, glabrous below, glandular-puberulent above; leaves filiform, somewhat acroese, 1-3 cm. long, sepals ovate-lanceolate, acute, scarious-margined; petals oblong, about 5 mm. long. Dry hills: Wyo.—Calif.—Ore. Submont. Je-Jl.

14. *A. compacta* Coville. Densely tufted perennial, with woody caudex; floral stems 2-10 cm. long, few-leaved; leaves mostly basal, densely clustered,

subulate, 3-6 mm. long; inflorescence open, few-flowered; bracts lance-subulate, sepals lanceolate, 3 mm. long, scarious-margined, glandular on the thick midrib, petals 3-4 mm. long. Dry mountains: Utah—Calif. *Submont.* Jl-S.

15. *A. Tweedyi* Rydb. Stem with somewhat ligneous base, usually less than 1 dm. high, glandular-puberulent especially in the inflorescence; leaves linear-filiform, 2-3 cm. long, less than 1 mm. wide; pedicels about 1 cm. long, sepals lanceolate, acute, about 5 mm. long, scarious-margined and decidedly glandular-puberulent; petals about 8 mm. long. Mountains: Colo. *Subalp.* Jl.

16. *A. Burkei* Howell. Stems woody at the base, 1-2 dm. high; leaves filiform, ascending, somewhat acrosc, 1-3 cm. long, glabrous; sepals ovate, acute or acuminate, scarious-margined, 4 mm. long; petals about 5 mm. long. *A. congesta subcongesta* S. Wats. *A. subcongesta* Rydb. Mountains: Wash.—Calif.—Colo.—Mont. *Mont.*—*Submont.* My-Jl

17. *A. aculeata* S. Wats. Stems woody and decumbent at the base, 1-2 dm. high, leafy at the base; leaves subulate-filiform, pungent, glabrous and glaucous; sepals ovate, acute, 4 mm. long; petals 5-6 mm. long. Arid mountains: Ore.—Ida.—Ariz.—Nev. *Son.*—*Submont.* Jl-Au.

18. *A. glabrescens* (S. Wats) Howell. More or less shrubby perennial, herbaceous branches 2-3 dm. long, glabrous; leaves glabrous, filiform, erect or ascending, 2-4 cm. long; sepals ovate-lanceolate or ovate, acute; petals 6-7 mm. long; capsule nearly twice as long as the calyx. *A. Fendleri glabrescens* S. Wats. *A. congesta macradenia* M. E. Jones, not *A. macradenia* S. Wats. Arid regions in the mountains: Utah—Nev.—Ariz. *Mont.* Je-Au.

19. *A. laxiflora* Rydb. Cespitose, tufted perennial, stems numerous, 2-4 dm. high, glabrous below, glandular-pubescent above, usually thickened at the nodes; leaves filiform, slender, 5-10 cm. long, pedicels long; lower bracts linear-subulate, the upper lanceolate; sepals 5-7 mm. long. *A. Fendleri diffusa* Porter. Mountains: Colo. *Submont.*—*Mont.* Je-Au.

20. *A. Fendleri* A. Gray. Stems 1-3 dm. high, strict, glabrous beneath, glandular above, leaves filiform, glabrous, more or less glaucous, rather firm, 3-8 cm. long; pedicels rather short; sepals 4-5 mm. long. Mountains and dry hills: Wyo.—N.M.—Ariz. *Submont.*—*Alp.* Je-Au.

21. *A. Eastwoodiae* Rydb. Stems about 2 dm. high; leaves filiform, stiff, pungent, 1-2 cm. long, 0.5 mm. wide, minutely scabrous-ciliolate on the margins below; pedicels erect, 1-2 cm. long, glabrous, sepals about 6 mm. long, glabrous, equalling or slightly exceeding the petals. Dry hills: N.M.—Colo.—Utah *Son.*—*Submont.* My.

22. *A. Franklinii* Dougl. Stems about 1 dm. high, angular in drying, leaves subulate, acrosc, 1-2 cm. long, arcuate-spreading; bracts lance-subulate, scarious-margined at the base; sepals linear-lanceolate, 8-12 mm. long. Sandy soil: Wash.—Ida.—Ore. *Plain*—*Submont.* My-Je.

23. *A. Hookeri* Nutt. Caudex woody, tufted; stems 4-15 cm. high, terete, more or less pubescent; leaves subulate, ascending or spreading, 0.5-5 cm. long, pungent; bracts lanceolate, scarious-margined; sepals lanceolate, 6-9 mm. long, petals oblong. *A. pinetorum* A. Nels. Dry hills. Mont.—Neb.—Colo. *Plain*—*Submont.* Je-Au.

7. *SAGINA* L. PEARLWORT

Low matted annuals or perennials. Leaves opposite, filiform or subulate. Flowers axillary, on more or less elongated pedicels. Sepals 4 or 5, persistent. Petals 4 or 5, white, entire or notched, or wanting. Stamens usually 5, alternate with the sepals. Capsule 4- or 5-valved, the valves opposite the sepals. Seeds usually numerous, not strophiolate.

Stem short, forming sterile rosettes at the base, perennials

Basal leaves filiform; petals shorter than the green sepals.

1 *S. saginoides*

Basal leaves subulate, petals longer than the purple-tinged sepals

2 *S. nivalis*

Stem slender, 5-10 cm. high, without sterile rosettes at the base, annuals

3. *S. occidentalis*

1. **S. saginoides** (L.) Britton. Stem 2-10 cm. high, decumbent, often rooting; leaves filiform, 5-15 mm. long; pedicels 5-20 mm. long, often curved at the summit; sepals oval, obtuse, 1.5-2 mm. long. *S. Linnaei* Presl. Wet places among rocks. Greenl.—Que.—N.M.—Calif.—Alaska; Eurasia. *Mont.*—*Subalp.* Je—Au

2. **S. nivalis** Fries. Stems 1-3 cm. high; leaves subulate, 3-8 mm. (rarely 1 cm.) long; pedicels 3-10 mm. long, straight or nearly so; sepals broadly oval, rounded, purple-edged, 2 mm. long. Wet places on the summits: Greenl.—Lab.—Alaska; Colo.; n. Eur. *Alp.* Jl.

3. **S. occidentalis** S. Wats. Stem 5-10 cm. high, branched near the base, decumbent or ascending; leaves narrowly linear, acute; pedicels 15-25 mm. long; calyx rounded at the base; sepals 5; capsule 3 mm. long. Low ground: B.C.—Ida.—Calif. *Submont.*

8. SPERGULA L. SPURRY, CORN SPURRY.

Somewhat succulent annuals. Leaves whorled and commonly clustered, thick, narrow, with stipules. Flowers in terminal cymes. Sepals 5, persistent. Petals 5, white, entire. Stamens 10, rarely 5. Ovary 1-celled; styles 5. Capsule 5-valved, the valves opposite the sepals. Seeds narrowly winged.

1. **S. arvensis** L. Annual; stems slender, branched from the base, 1.5-5 dm. high, leaves linear-filiform, sparingly villous or glabrate, 3-5 cm. long; cymes terminal, loose, many-flowered; pedicels reflexed in fruit; sepals ovate, 3-4 mm. long; petals equalling or slightly exceeding the sepals. Cultivated grounds and waste places: N.S.—Fla.—Calif.—Alaska; adv. or nat. from Eu. Je—S.

9. TIFSA Adans. SAND SPURRY.

Low annual, biennial, or perennial herbs, usually rather succulent. Leaves opposite, with stipules, often with secondary leaves fascicled in their axils. Flowers in terminal, racemiform cymes. Sepals 5, persistent. Petals 5, rarely fewer, or wanting, pink or whitish, entire. Stamens 2-10. Ovary 1-celled; styles 3. Capsule 3-valved to the base. Seeds often margined, smooth or tubercled. [*SPERGULARIA* J. & C. Presl.]

Stipules lanceolate or ovate-lanceolate, longer than broad

1. *T. rubra*.

Stipules broadly triangular, as broad as long or broader

Stipules triangular, about as long as broad; internodes of the stem much shorter than the leaves, seeds rough

2. *T. salina*.

Stipules very broadly triangular, almost twice as broad as long, middle internodes about equalling the nodes, seeds smooth.

3. *T. sparsiflora*

1. **T. rubra** (L.) Britton. Annual or perennial; stem spreading, much branched from the base, glabrous or more or less glandular above; leaves flat or slightly grooved, linear-filiform, 8-12 mm. long; stipules attenuate, 4-6 mm. long; sepals oblong-lanceolate, scarious-margined, 3-4 mm. long; petals scarcely equalling the calyx. *Spergularia rubra* J. & C. Presl. Sandy soil and waste places: Newf.—Va.—O.; Calif.—Mont.—B.C.; Eu. *Plain.* My—Au.

2. **T. salina** (Presl.) Greenc. Annual; stem usually diffuse, branched, more or less pubescent, 1-2 dm. high; leaves linear-filiform, fleshy, terete, 1-4 cm. long; sepals ovate, acutish or obtuse, 4-5 mm. long; petals pink, shorter than the sepals. *S. salina* J. & C. Presl. *T. marina* Britton. Saline soil: N.B.—Fla.—Sask.; Alaska—Calif. Ap—S.

3. **T. sparsiflora** Greene. Annual; stems somewhat branched, ascending or diffuse, glandular-pubescent; leaves linear-filiform, acute, 1-2.5 cm. long; sepals ovate, obtusish, about 4 mm. long, glandular-pubescent; petals lilac. Saline soil: Mont.—Colo.—Nev.—B.C. *Plain.* My—S.

10. LOEFLINGIA L.

Small diffusely branched, glandular or glabrous annuals. Leaves subulate, with stipules. Flowers solitary or fascicled in the axils. Sepals 5, rigid, keeled, awn-pointed. Petals 2-5, minute, without claws, or wanting. Stamens 3-5,

perigynous. Ovary 1-celled, many-ovuled; stigmas sessile. Capsule 3-valved. Cotyledons accumbent.

1. *L. texana* Hook. Annual, branched at the base, 5-15 cm. high; leaves 4-6 mm. long; flowers on secund recurved branches; sepals straight or slightly curved; capsule shorter than the calyx; seeds obovate. Dry hills. Tex.—Neb. Plain. Ap-Je.

FAMILY 45. **CARYOPHYLLACEAE.** PINK FAMILY.

Herbs with narrow opposite leaves, without stipules, often connate at the base. Flowers perfect, polygamous, or dioecious, cymose. Calyx of 5 or 4 united sepals. Petals 5 or 4, distinct, with a narrow claw, often with scale-like appendages (the crown) at the junction of the claw with the blade. Stamens usually twice as many as the sepals. Gynoecium of 2-5 united carpels; styles 2-5. Fruit a 1-celled or partially 2-5-celled capsule, opening by 2-5 valves at the apex.

Calyx with at least twice as many ribs (usually 10) as calyx-teeth, running both into the teeth and the sinuses

Styles 5, alternate with the foliaceous calyx-lobes.

Styles either 5 and opposite the short calyx-lobes or fewer than 5.

Styles mostly 3, capsule usually septate at the base

Styles 5; capsule 1-celled to the base.

Calyx 5-angled or 5-ribbed

Petals with a crown; calyx not strongly angled

Petals without a crown, calyx strongly 5-angled

1. AGROSTEMMA

2. SILENE

3. WAHLBERGELLA

4. SAPONARIA

5. VACCARIA.

1. **AGROSTEMMA** L. CORN COCKLE, CORN CAMPION.

Annual pubescent herbs, with opposite leaves. Flowers solitary at the end of the branches. Calyx oblong, not inflated, 10-ribbed, 5-lobed; lobes linear, elongate and foliaceous. Petals 5, clawed, without appendages or crown, blade obovate or cuneate, emarginate. Stamens 10. Styles 5, opposite the petals. Capsule 1-celled. Seeds numerous.

1. *Agrostemma Githago* L. Stem erect, 3-10 dm. high, densely pubescent; leaves linear-lanceolate, erect, 5-10 cm. long; calyx-lobes 2-3 cm. long; petals red; blade 1.5-2 cm. long. Waste places and grain fields: Newf.—Fla.—Calif.—B.C.; nat. from Eu. Ji-S.

2. **SILENE** L. CATCHFLY, CAMPION.

Annual or perennial herbs. Leaves opposite, flat, entire. Flowers perfect, in terminal cymes, or rarely solitary. Calyx with a more or less inflated tube, 10-many-nerved, with short, erect, or spreading lobes. Petals 5, red, pink, or white, with a crown, and usually cleft or divided. Stamens 10. Ovary 1-celled, but usually with partial partitions at the base. Styles 3, seldom more. Capsule opening by twice as many tooth-like valves as there are styles. Ovary with a more or less developed stipe. Seeds tuberculate or echinate.

Annuals.

Glabrous or nearly so, or the upper nodes glutinous

Viscid-pubescent or hirsute throughout.

1 *S. antirrhina*

2 *S. noctiflora*

Perennials

Calyx mostly 10-nerved, rarely strongly inflated in fruit, not constricted at the mouth.

Cauliscent herbs, rather tall, not densely matted, with rootstocks

Inflorescence paniculate or thyrsoid at the end of the stem, not leafy; flowers more than 1 cm. long.

Blade of the petals 2-parted and cleft into 4-6 linear segments

3 *S. oregana*

Blades of the petals bifid; each lobe sometimes with a lateral tooth. Blade small, scarcely exceeding the small appendages, plant viscid-tomentose.

4. *S. Spaldingii*

Blades conspicuous, much longer than the appendages; plant viscid-puberulent or glabrous

Stipe of the capsule over 5 mm. long; fruiting calyx distinctly contracted below.

5. *S. repens*

Stipe of the capsule short, less than 5 mm. long, calyx slightly, if at all contracted below.

Plants comparatively few-flowered; inflorescence not verticillately racemose or spicate, branches mostly ascending and bracts shorter than the calyx

Stem nearly glabrous, flowers solitary or 3-5 in an open cyme, leaves grass-like 6. *S. monantha*

Stem puberulent throughout or viscid above, leaves not grass-like

Calyx short, its lobes rounded, with dilated scarious margins. 7. *S. columbiana*

Calyx long, its lobes ovate, margins scarcely dilated

Calyx inflated in fruit, purple-veined, stem viscid above

Plant very viscid, leaves thick, the basal ones narrowly linear-oblancoaleate, calyx less inflated

8. *S. Lyallii*

Plant usually viscid only above, leaves thin, the basal ones oblanceolate or spatulate; calyx much inflated and rounded below

9. *S. multicaulis*

Calyx scarcely inflated in fruit, narrowed downward; veins green, plant not viscid 10. *S. Douglasii*

Plants many-flowered, more or less verticillately racemose or spicate, with erect branches, lower bracts longer than the calyx

Claw and auricles of the petals narrow, the latter lacinate

11. *S. Scouleri*

Claw and auricles of the petals broad; the latter ciliate.

12. *S. Hallii*

Inflorescence leafy, flowers borne in the axils of the branches, less than 1 cm. long

13. *S. Menziesii*

Plant subcaulescent, densely caespitose-pulvinate

14. *S. acaulis*

Calyx 15-20-nerved, strongly inflated in fruit and more or less constricted at the mouth

15. *S. vulgaris*

1. *S. antirrhina* L. Stem 1.5-5 dm. (rarely 6-10 dm.) high, finely puberulent below; branches strongly ascending or nearly erect, usually more or less viscid about the middle of the internodes; lower leaves oblanceolate, 5-10 cm. long, the upper linear to lanceolate; calyx in flower fusiform, 8-10 mm. long; lobes lanceolate or ovate-lanceolate, usually acute, often purple-tipped; petals purple or rose-tipped, exceeding the sepals and with a 2-cleft blade, or shorter and with a truncate blade, or wanting; fruit broadly ellipsoid, 6-8 mm. long, about 4 mm. thick. SLEEPY CATCHFLY. Waste places, fields, etc.: Newf.—Fla.—Calif.—B.C. Plain—Submont. Ap—Au.

2. *S. noctiflora* L. Stem stout, viscid-pubescent, 3-10 dm. high; lower leaves obovate or oblanceolate, 5-12 cm. long, obtuse, viscid-hirsute, short-petioled; upper leaves lanceolate, acuminate, sessile; calyx 2-3 cm. long, at first nearly tubular; petals white or pinkish, about 3 cm. long, somewhat exceeding the calyx, 2-cleft; capsule sessile, ellipsoid. NIGHT-BLOOMING CATCHFLY. Waste places and cultivated ground: N.S.—Fla.—Utah—Wash.; nat. from Eu. Plain—Submont. My—Au.

3. *S. oregana* S. Wats. Stem 3-5 dm. high, more or less viscid-puberulent; lower leaves oblanceolate, 5-10 cm. long, viscid-puberulent, the upper linear-lanceolate; calyx oblong-cylindric, about 15 mm. long; petals white, fully 2 cm. long, claws auricled above; capsule stipitate, ovoid. Mountain valleys: Mont.—Wyo.—Ore.—Wash. Submont.—Subalp. Jl—S.

4. *S. Spaldingii* S. Wats. Stems stout, leafy, viscid-villous, 3-5 dm. high; lower leaves oblanceolate, the upper lanceolate, densely viscid-pubescent; calyx oblong-cylindric, 15-20 mm. long; petals not exceeding the calyx, greenish white; claw broad, auricled; capsule stipitate, ovate-oblong. Mountains: Wash.—Mont.—Ida.—Ore. Submont. Au—S.

5. *S. repens* Patrin. Stems several, finely puberulent, decumbent below; leaves linear-lanceolate or nearly linear, densely and finely pubescent; calyx cylindric or somewhat clavate, villous, usually more or less purplish, 10-12 mm. long; petals rose-colored, 15-18 mm. long; blade bifid. *S. purpurata* Greene. Valleys: Mont.—Yukon—Alaska; Siberia. Submont.—Mont. Jl—Au.

6. *S. monantha* S. Wats. Stem weak, 2-3 dm. high; leaves linear or narrowly oblanceolate, 4-7 cm long, acuminate; calyx inflated, thin, about 12 mm. long; teeth triangular, acutish, scarious-margined; petals about 18 mm.

long, white or pinkish; claw naked, narrowly auricled; blade bifid, with rounded lobes. Mountains: Calif.—Utah—Wash. *Submont.*

7. ***S. columbiana*** Howell. Stems 2–3 dm. high, puberulent, not viscid; leaves narrowly oblanceolate or linear, puberulent, 4–6 cm. long; calyx campanulate, inflated, 8–12 mm. long, puberulent; petals white, 15–18 mm. long; claws with broad auricles; blades deeply 2-cleft, with rounded lobes; capsule short-stipitate. *S. Douglasii brachycalyx* B. L. Robins. Hillsides: Wash.—Ida.—Utah. *Submont.*—*Mont.* Je—Au.

8. ***S. Lyallii*** S. Wats. Stem 1–3 dm. high, minutely puberulent below, glandular above; leaves linear-lanceolate or oblanceolate, 5–7 cm. long, puberulent; calyx 8–10 mm. long, usually purple-tinged; lobes short-ovate, obtuse, petals 12–15 mm. long, white or brownish purple; claws broadly auricled; blades bifid, with a linear tooth on each side; appendages oblong or quadrate. *S. Macounii* S. Wats. *S. tetonensis* E. Nels. Mountains: Alta.—Wyo.—Utah—Ore.—B.C. *Submont.*—*Alp.* Jl—Au.

9. ***S. multicaulis*** Nutt. Stems 2–4 dm. high, puberulent; lower leaves oblanceolate or spatulate, 3–7 cm. long, thin; upper leaves linear; calyx about 15 mm. long; lobes ovate, obtuse or acute; petals 2–2.5 cm. long, white, 2-cleft, claw broad and auricled. Mountains: Alta.—Wyo.—Ore.—B.C. *Plain—Mont.* Jl—Au.

10. ***S. Douglasii*** Hook. Stems 3–5 dm. high, puberulent; leaves narrowly oblanceolate to linear, more or less puberulent, 5–10 cm. long; cyme few-flowered, calyx 15–18 mm. long, puberulent; lobes ovate, obtuse; petals 2–2.5 cm. long, pink or white; capsule stipitate, ovoid. Mountains: Mont.—Utah—Calif.—B.C. *Submont.*—*Subalp.* My—Au.

11. ***S. Scouleri*** Hook. Stems simple, 3–7 dm. high, puberulent and glandular above; lower leaves narrowly oblanceolate, 5–10 cm. long, densely puberulent, the upper ones linear or linear-lanceolate; inflorescence 1.5–2 dm. long; calyx oblong-clavate, strongly veined; petals 15–20 mm. long, white or purplish, blades bifid; appendages blunt; capsule stipitate. Mountains: Mont.—Colo.—Ore.—B.C. *Submont.*—*Mont.* Jl—S.

12. ***S. Hallii*** S. Wats. Stems 2–4 dm. high, puberulent and more or less glandular; lower leaves narrowly oblanceolate, 5–10 cm. long, finely pubescent, upper leaves linear; calyx oblong or campanulate, strongly striate, about 15 mm. long; lobes triangular, acute, with scarious margins; petals purple, slightly exceeding the calyx; capsule short-stipitate. Mountains: Colo.—N.M. *Submont.*—*Subalp.* Jl—Au.

13. ***S. Menziesii*** Hook. Stems erect or ascending, 1–3 dm. high, dichotomously branched, very leafy, retrorsely hirsutulous and more or less glandular-villous, especially above; leaves ovate-lanceolate to linear-lanceolate, acuminate at both ends, 3–8 cm. long; calyx turbinate-obovoid, 5–8 mm. long; petals 2-cleft, white, 6–10 mm. long, without a crown (always?); capsule sessile, ellipsoid, slightly exceeding the calyx. *S. stellaroides* Nutt., a narrow-leaved form. Among bushes: Sask.—Mo.—N.M.—Calif.—Mont. *Submont.*—*Subalp.* My—S.

14. ***S. acaulis*** L. Leaves linear, more or less glandular-ciliate, 5–10 mm. long (in var. *subacaulescens* 1–4 cm. long); flowers polygamo-dioecious, the pistillate ones usually somewhat smaller, in the typical form on peduncles 1–4 cm. long or (in var. *excapa*) sessile or nearly so; calyx oblong, 5–6 mm. long, rounded or sunken or rarely acute at the base; petals pink or purple, exceeding the calyx, emarginate or 2-lobed, rarely entire; capsule cylindric, exceeding the calyx, sessile, or (in the var. *excapa*) ovoid or subglobose. Moss CAMPHON. Alpine-arctic situations: Greenl.—N.H.—N.M.—Ariz.—Alaska; Eurasia. *Mont.*—*Alp.* Je—Au

15. ***S. vulgaris*** (Moench) Garcke. Cespitose caulescent perennial; stems glabrous or nearly so, 2–4 dm. high; leaves lanceolate, acute, 3–5 cm. long, glabrous; flowers polygamo-dioecious; calyx campanulate to subglobose; petals white or pink, 2-cleft, almost without crown. *S. inflata* Smith. BLADDER CAMPHON. Fields, roadsides, and waste places: N.B.—N.J.—Colo.—Alta; Calif.—Wash.; adv. or nat. from Eu. *Plain—Submont.* My—S.

3. WAHLBERGELLA Fries.

Perennial herbs, with opposite leaves. Calyx ovoid, more or less inflated, 5-toothed, 10-nerved. Petals inconspicuous, often included, with small crowns and 2-cleft blades. Stamens 10. Styles 5, rarely 4, alternating with the petals. Ovary strictly 1-celled. Capsule opening by twice as many valves as there are styles. Seeds laterally attached; embryo curved. [*Lychnis* Am. auth. in part.]

Tall, usually 3 dm. high or more, several to many-flowered, in narrow cymes.

Petals included.

1. *W. Drummondii*.

Petals exserted.

Ovary sessile; blades of the petals emarginate.

2. *W. striata*.

Ovary stipitate, blades of the petals 2-cleft.

3. *W. Parryi*.

Low, about 1 dm. high; flowers solitary, or 2 or 3, seeds winged.

Flowers in anthesis erect; fruiting calyx not much inflated.

Petals usually exserted; claw broad; blade short and broad, emarginate.

Claws of the petals and the filaments naked; plant glandular-villous.

4. *W. affinis*.

Claws of the petals and the filaments ciliate, plant puberulent.

5. *W. Kingii*.

Petals usually included; claws and blades narrow; the latter bifid; filaments glabrous.

6. *W. montana*.

Flowers in anthesis nodding; fruiting calyx much inflated.

Petals slightly exserted, calyx-lobes broadly lanceolate, five of the stamens adnate to the petals for one-third their length.

7. *W. attenuata*.

Petals included, calyx-lobes short, rounded-ovate, five of the stamens only slightly adnate to the petals at the base.

8. *W. apetalata*.

1. *W. Drummondii* (Hook.) Rydb. Stems viscid-puberulent throughout, 2-4 dm. high; basal leaves oblanceolate, petioled, 5-10 cm. long, grayish puberulent, early deciduous; stem-leaves linear, attenuate; calyx oblong-cylindric, with green nerves, glandular-viscid, 10-12 mm. long; petals white or purplish; blade narrower than the claw. *Silene Drummondii* Hook. *L. Drummondii* S. Wats. Dry hillsides and plains: Man.—N.M.—Ariz.—B.C. Plain—Mont. Je—Au.

2. *W. striata* Rydb. Stems 3-5 dm. high, finely puberulent and more or less viscid above; basal leaves and lower stem-leaves narrowly oblanceolate, 5-15 cm. long; upper stem-leaves sessile and linear-lanceolate; calyx densely viscid-puberulent, strongly 10-nerved, 10-12 mm. long; lobes oblong, obtuse; petals about 15 mm. long; claw long, narrowly cuneate. *L. striata* Rydb. Hillsides. Wyo.—Colo.—Utah.—Alta. Mont. Jl—Au.

3. *W. Parryi* (S. Wats.) Rydb. Stem slender, about 3 dm. high, finely pubescent, glandular above; leaves linear, 3-6 cm. long; calyx inflated, ovate-oblong, about 12 mm. long; teeth broad, acute; petals purplish, about 16 mm. long, claw broadly auricled. *L. Parryi* S. Wats. Hills: Wyo. Submont.

4. *W. affinis* (Vahl.) Fries. Stem 1-3 dm. high, glandular-villous throughout; leaves linear or narrowly linear-oblanceolate, 1-3 cm. long, glandular-villous, calyx ellipsoid, usually contracted at the mouth, in flower 8-10 mm. long; teeth short, acutish; petals white or pink; claws auricled. *L. affinis* Vahl. High mountains: Greenl.—Lab.—Alta.; Eurasia. Alp.—Subalp. Jl—Au.

5. *W. Kingii* (S. Wats.) Rydb. Stems erect, 1-2 dm. high, densely puberulent and glandular above; leaves narrowly linear-oblanceolate; calyx about 12 mm. long; lobes ovate, rounded at the apex; petals exserted; appendages oblong. *L. Kingii* S. Wats. Mountains: Utah. Subalp. Jl.

6. *W. montana* (S. Wats.) Rydb. Stem nearly glabrous below, glandular above, slender, 0.5-1 dm. high; leaves linear-oblanceolate, 3-5 cm. long, ciliate on the petioles; calyx ovate-campanulate, 10-12 mm. long; teeth short, acute. *L. montana* S. Wats. Mountain peaks: Colo.—Wyo. Subalp.—Alp.

7. *W. attenuata* (Farr.) Rydb. Stem 1-1.5 dm. high, slender, sparingly villous; leaves linear, 2-7 cm. long, light green, sparingly pubescent; flowers 1-2, nodding in anthesis; calyx ellipsoid, somewhat inflated, narrowed at the mouth, densely villous; petals purple; blades cuneate, bifid. High mountains: Alta.—B.C. Subalp. Jl—Au.

8. *W. apetalata* (L.) Fries. Stems 0.5-2 dm. high, puberulent and more or less glandular-viscid; flowers at first drooping, erect in fruit, perfect or pistillate;

calyx ellipsoid, much inflated, 12-15 mm. long, glandular-pubescent; lobes very broad, rounded-ovate; petals included; blades very short, bifid; claws auricled. High mountains: Greenl.—Lab.—Mont.—Colo.—Utah—Alaska; Eurasia. *Alp*—*Subalp*. JI—Au.

4. **SAPONARIA** L. SOAPWORT, BOUNCING BET.

Perennial herbs, with opposite broad leaves. Calyx 5-toothed, obscurely 5-nerved. Petals 5, long-clawed, with appendages (crown). Stamens 10. Ovary 1-celled or incompletely 2-4-celled; styles 2. Capsule dehiscent by 4 apical teeth or valves.

1. **S. officinalis** L. Glabrous perennial; stem 3-6 dm. high; leaves oval or ovate, 5-8 cm. long, 3-5-ribbed; flowers in dense corymbiform cymes; calyx tubular, 1.5-2 cm. long; petals pink or white; blades obcordate; capsule oblong. Roadsides and waste places: N.S.—Fla.—N.M.—Colo.; nat. from Eu. *Plain*—*Submont*. JI—S.

5. **VACCARIA** Medic. COW-HERB, COW COCKLE.

Annual caulescent herbs, with glabrous and glaucous, opposite, often thickish, clasping leaves. Flowers in dichotomous cymes. Calyx somewhat inflated, strongly 5-angled and 5-nerved; lobes very short. Petals conspicuous, longer than the calyx, without a crown. Stamens 10. Ovary 1-celled; styles 2. Capsule opening by 4 apical, tooth-like valves. Seeds laterally attached; embryo slightly curved.

1. **V. Vaccaria** (L.) Britton Annual; stem 3-10 dm high, branched; leaves ovate to lanceolate, connate at the base, 2-8 cm. long; calyx with the sharp angles herbaceous, and the intervening parts scarious and white, 1-1.5 cm. long; petals rose-colored, crenulate. *Saponaria Vaccaria* L. In waste places: Ont—Fla.—Calif.—Alaska.; nat. from Eu. *Plain*—*Submont*. Je—Au.

FAMILY 46. **CERATOPHYLLACEAE**. HORNWORT FAMILY.

Submerged aquatic herbs, with verticillate leaves, thrice dissected dichotomously into filiform stiff divisions. Flowers monoecious, inconspicuous, sessile, axillary. Sepals 6-12, herbaceous, valvate. Petals wanting. Stamens 10-24, with very short filaments. Pistil 1; ovary 1-celled. Fruit nut-like, with a persistent style. Seeds pendulous; embryo straight.

1. **CERATOPHYLLUM** L. HORNWORT.

Characters of the family.

1. **C. demersum** L. Stems 3-12 dm long; leaves rather rigid, 6-9 in each whorl, 1-3 cm. long, once, twice, or thrice forking, the ultimate segments spiny-toothed; achenes oblong, slightly flattened, 5 mm. long, tipped with the persistent style and armed with spreading spines at the base. Ponds and still water: Newf.—Fla.—Calif.—Wash; W.Ind., Mex, Eurasia. *Plain*. Je—Jl.

FAMILY 47. **NYMPHAEACEAE**. WATER LILY FAMILY.

Perennial acaulescent water plants, with stout elongate rootstocks. Leaves with elongate petioles and broad leathery floating blades cordate or sagittate at the base. Flowers solitary, long-pedicelled, perfect. Sepals 4-7, green or partly colored. Petals numerous, often passing into stammodia and stamens. Stamens numerous. Gynoeceium of several more or less united carpels, forming a compound pistil; stigmas united into a disk. Ovules numerous, parietal. Fruit a leathery berry.

Petals small, staminodia-like; stamens hypogynous.
Petals at least as large as the sepals; stamens epigynous.

1. **NYMPHAEA**.
2. **CASTALIA**

1. **NYMPHAEA** (Tourn.) L. YELLOW POND LILY, SPATTER-DOCK.

Flowers yellow. Sepals 5-7, leathery, concave. Petals 10-20, small filament-like. Filaments flattened, inserted under the ovary. Stigmas forming an 8-24-radiate disk. Fruit with a leathery pericarp; seeds pendulous. [*Nuphar* Sibth.]

Leaves 1-3 dm. long, the sinus extending about one-third their length; petals cuneate to oblanceolate, truncate, stigma 10-25-rayed.

Sepals 9-12, flowers 6-10 cm. in diameter, stamens red. 1. *N. polysepala*.
 Sepals usually 6, flowers 4-7 cm. in diameter, stamens yellow. 2. *N. variegata*.
 Leaves 5-10 cm. long, the sinus extending fully one-half their length; petals spatulate, thin, stigma 7-10-rayed, flowers about 2.5 cm. in diameter. 3. *N. microphylla*.

1. *N. polysepala* (Engelm.) Greene. Leaf-blades oval, 2-3 dm. long, 1.5-2 dm. wide, with a narrow or closed sinus; sepals 6-12, yellow, reddish tinged; petals 12-18, cuneate, 1-1.5 cm. long; stigma 15-25-rayed, crenate; fruit about 3.5 cm. in diameter, with a constricted neck. Lakes and slow streams: Mont.—(Black Hills) S.D.—Calif.—Alaska. *Plan*—*Subalp.* Ap—Au.

2. *N. variegata* (Engelm.) G. S. Miller. Leaf-blades rounded-ovate or broadly oval in outline, 1-2 dm. long, 8-15 cm. wide, with a narrow or closed sinus, outer sepals green, the rest with bright yellow edges, red or maroon towards the base within; petals oblanceolate; stigma 10-16-rayed; fruit scarcely constricted into a neck. *N. americana* (Prov.) Mill. & Standl. Lakes and slow streams: Lab—N.J.—Wyo.—B.C. *Plan*—*Submont.* Je—Au.

3. *N. microphylla* Pers. Leaf-blades 3-10 cm. long, oval or ovate, with a very deep sinus, sepals about 5, mostly yellow, 12-15 mm. long; petals 4 mm. long, stigma usually deep red, distinctly lobed; fruit 12-15 mm. in diameter, with a narrow neck. *N. kalmiana* (Michx.) Sims. Ponds: Newf.—Pa.—Sask. *Boreal.* Jl—Au.

2. **CASTALIA** Salisb. WATER LILY, POND LILY.

Flowers in ours white. Sepals 4. Petals numerous, imbricate in several series, grading into staminodia and stamens. Stamens numerous, epigynous. Stigma 12-35-rayed, with a globular projection in the middle. Fruit with a leathery pericarp, maturing under water. Seeds numerous, surrounded by a sack-like aril. [*Nymphaea* L., in part.]

1. *C. Leibergii* Morong. Leaves broadly obovate in outline, 6-10 cm. long, 4-6 cm. wide, sinus deep, often extending more than half the length of the leaves; basal lobes acute; flowers 4-6 cm. wide; sepals green outside, elliptic, often acutish; petals 8-10, white, purple-veined, obtuse; stamens 20-30; stigma 7-8-rayed. Ponds: Ida.—W. Ont. and northward. *Mont.*—*Boreal.* Jl—Au.

FAMILY 48. **RANUNCULACEAE**, CROWFOOT FAMILY.

Herbs or climbing shrubs. Leaves alternate, except in *Clematis*, *Viorna*, and *Atragene*, simple or compound, without stipules. Flowers regular or irregular. Sepals 3-15, usually green and caducous, or in genera without petals persistent and more or less petaloid, imbricate, or in *Clematis*, etc., valvate. Petals as many as the sepals or wanting. Stamens usually many, rarely 5. Carpels numerous or few, distinct, rarely solitary, 1-celled, 1-many-ovuled. Fruit of achenes, follicles, or berries.

Carpels 1-ovuled, fruit of achenes.

Petals wanting, sepals often petal-like.

Sepals imbricate in the bud; leaves all alternate, or only those subtending the inflorescence opposite.

Flowers subtended by opposite or verticillate leaf-like bracts.

Styles short, not elongating in fruit.

Styles much elongating in fruit, plumose.

Flowers not subtended by opposite or verticillate bracts.

Leaves ternately compound.

Leaves palmately cleft.

Sepals valvate in the bud, leaves all opposite.

1. *ANEMONE*.

2. *PULSATILLA*.

3. *THALICTRUM*.

4. *TRAUTVETTERIA*.

- Stamens erect; sepals thickish, more or less converging; staminodia wanting
6 VIORNA.
- Stamens spreading; sepals spreading from the base.
Flowers mostly paniculate; sepals white or yellow, firm, without a border;
staminodia wanting. 5 CLEMATIS.
- Flowers solitary, sepals blue or purple, thin; staminodia usually present
7. ATRAGENE
- Petals usually present
- Sepals spurred; small annuals with basal linear leaves, receptacle in fruit elongate-
cylindrical; stamens 5 8 MYOSURUS
- Sepals not spurred, plant usually bearing cauline as well as basal leaves, receptacle
in fruit spherical, conical or short-cylindric, stamens more than 5
- Achenes transversely wrinkled, petals white 9 BATRACHIMUM
- Achenes not transversely wrinkled.
- Achenes not ribbed
- Petals yellow, at least without; sepals deciduous
- Achenes without an empty upper portion, plants not scapose
10 RANUNCULUS
- Achenes with the lower half enclosing the seed, the upper portion
empty, flattened and spongy; plants scapose. 11. COPTIDIUM
- Petals pink, rose-colored, or white, sepals marcescent-persistent
12 BECKWITHIA
- Achenes longitudinally ribbed; petals yellow.
- Achenes compressed; leaves simple, crenate or lobed
13 HALERPESTES
- Achenes terete; leaves compound 14 CYRTORHYNCHA
- *Carpels with several ovules, fruit of follicles or berries.
- Hypanthium not developed, petals wholly superior.
- Flowers regular.
- Petals inconspicuous or none, not spurred.
- Fruit of follicles, flowers solitary
- Follicles sessile; leaves simple or cleft
- Petals wanting, leaf-blades entire or merely toothed
15. CALTHA
- Petals present, but small, linear, leaf-blades palmately parted and
toothed 16 TROLLIUS
- Follicles stipitate, petals clawed; leaves compound or dissected.
- Petals hooded and nectariferous at the summit; leaves ternate
17 COPTIS.
- Petals filiform or linear beyond the nectariferous pit; leaves pin-
nately dissected 18 CHRYSOCOPTIS
- Fruit a berry, leaves twice or thrice ternately compound
19 ACTAEA
- Petals conspicuous, produced into a spur or at least saccate at the base, leaves
ternately compound. 20. AQUILEGIA
- Flowers irregular
- Posterior sepal spurred 21. DELPHINIUM
- Posterior sepal hooded, helmet-shaped or boat-shaped 22. ACONITUM
- Hypanthium somewhat developed, lined at the mouth by a fleshy perigynous disk
23. PAEONIA.

1. ANEMONE (Tourn.) L. WIND-FLOWER, ANEMONE.

Perennial herbs, usually with horizontal rootstocks and erect scapes. Leaves basal, petioled, palmately divided or dissected. Bracts verticillate, usually 3, similar to the leaves, remote from the flower. Flowers terminal, solitary or cymose. Sepals 4-20, mostly 5, petal-like. Petals wanting. Stamens numerous. Pistils usually numerous. Achenes compressed, 1-seeded. Stigmas introrse, unilateral.

Plants with tuberous roots, sepals 6-20

1. *A. tuberosa*

Plants with a rootstock, sepals 5-6, rarely more.

Achenes densely villous.

Style filiform, usually deciduous, heads of fruit spherical or nearly so, involucrel

leaves short-petioled or sessile

Leaves ternate, segments broadly cuneate or flabelliform, crenate or slightly

cleft

Leaves 2-4 times ternate; segments linear to oblong or oblanceolate

Styles 1-3 mm. long, leaves 2-3 times ternate

Achenes merely strigose on the back, densely villous on the sides, styles

2-3 mm. long, leaf-blades glabrate; segments oblanceolate

3. *A. tetensis*

Achenes villous all over; style 1-2 mm. long

Leaflets thick, glabrate, strongly veined; segments oblanceolate.

acutish

4. *A. lithophila*

Leaf-blades thin, usually long-hairy, not strongly veined, segments

linear to lanceolate, acute

5. *A. globosa*.

- Styles 4-6 mm long, leaves 3-4 times ternate, segments narrowly linear.
 6. *A. Drummondii*.
 Styles subulate, persistent; heads of fruit from rounded oblong to cylindric;
 involucre leaves long-petioled
 Heads elongate, cylindric, styles about 1 mm long; flowers usually subumbel-
 late
 7. *A. cylindrica*.
 Heads of fruit rounded-oblong, styles about 2 mm long, flowers truly cymose.
 Petals greenish white, 1 cm. long or less, styles in fruit divergent
 8. *A. virginiana*.
 9. *A. riparia*.
 Petals white, 1.5 cm long; styles suberect.
 Achenes not villous.
 Achenes wing-margined, plant stout
 Sepals yellow, styles very long, reflexed.
 10. *A. Richardsonsii*.
 Sepals white or pink, styles not reflexed
 Flowers cymose, achenes sparsely hirsute when young, sessile, styles long,
 straight
 11. *A. canadensis*.
 Flowers subumbellate, achenes glabrous, stipitate, styles short, curved
 12. *A. zephyra*.
 Achenes not wing-margined, pilose, style minute, plant slender, flowers solitary.
 13. *A. Piperi*.
1. ***A. tuberosa*** Rydb. Stem 1-3 dm. high; basal leaves twice ternate; divisions rhombic-cuneate in outline, ternately cleft and toothed; involucre leaves similar, but short-petioled; peduncle solitary or a second one with a smaller involucre; sepals white or purplish, oblong-linear, 1-2 cm. long; head of fruit ellipsoid; achenes densely woolly; style filiform, about 1.5 mm. long. *A. sphenophylla* Britton, not Poepp. Dry plains and hills: N.M.—Utah—Calif. L. Son F-Ap.
2. ***A. parviflora*** Michx. Stem 5-20 cm. high; leaves ternate, thick, and firm, glabrous above, silky-strigose beneath; divisions cuneate, 1-2 cm. long; sepals white or tinged with bluish or rose, oval, 8-18 mm. long; head of fruit spherical. In arctic-alpine situations: Lab.—Ont.—Mont.—Colo.—Alaska; Asia. Mont.—Subalp. My-Au.
3. ***A. tetonensis*** Porter. Stem silky, 1-3 dm. high, 1-3-flowered, the secondary peduncles with smaller involucre; leaf-blades twice ternate, 2-5 cm. broad, involucre leaves similar, but sessile; sepals oval, 6-10 mm long, often dark purple, more rarely white, and tinged with blue on the outside; head of fruit hemispherical, 10-15 mm. in diameter. *A. stylosa* A. Nels. Mountains: Alta.—Wyo.—Utah—Wash.—B.C. Submont.—Subalp. JI-Au.
4. ***A. lithophila*** Rydb. Stem 1-2 dm. high, sparingly pubescent with long silky hairs; basal leaves thickish, shining, somewhat glaucous; divisions about 3 cm. long, deeply 3-cleft, again cleft and toothed; sepals silky, ochroleucous, tinged with blue, 12-15 mm. long, broadly obovate or oval; head of fruit globose. Rocky mountain tops: Mont.—Wyo.—Utah. Submont.—Subalp. JI-Au.
5. ***A. globosa*** Nutt. Stem 2-5 dm. high, silky-villous, 1-3-flowered; leaf-blades 5-12 cm. broad, thrice cleft; sepals oval, 6-12 mm. long, pink or purplish or ochroleucous, tinged with bluish on the outside; heads of fruit globose or ovoid, 10-12 mm. in diameter. *A. multifida* Hook., in part, not Poir. Meadows and hillsides: Alaska—Calif.—Colo.—S.D.—Sask.—Mack. Plain—Subalp. My-S.
6. ***A. Drummondii*** S. Wats. Stem 1-2 dm. high, usually 1-flowered, silky-hirsute; leaf-blades 2-6 cm. broad, silky-hirsute; sepals oval, 8-10 mm. long, tinged with blue; heads of fruit spherical, about 1 cm. thick; achenes densely woolly. High mountains: B.C.—Alta.—Ida.—Calif. Mont.—Subalp. JI-Au.
7. ***A. cylindrica*** A. Gray. Stem 3-6 dm. high, 1-10-flowered; leaf-blades strigose-pubescent, 3-8 cm. wide, ternate or quinnate; divisions rhombic-cuneate, 3-cleft and again cleft or toothed, with ovate or lanceolate teeth or lobes; involucre ones similar, clustered together with those of the secondary peduncles, the lowest node of which usually is very short or obsolete, the inflorescence therefore becoming umbelliform; sepals greenish white, oblong, 8-10 mm. long; heads in fruit 2-4 cm. long, about 1 cm. thick. Meadows, hillsides, and river banks: N.B.—N.J.—Ariz.—B.C. Plain—Submont. Je-Au.
8. ***A. virginiana*** L. Stem 6-10 dm. high, hirsute, 1-7-flowered; leaf-blades 10-15 cm. broad, ternate or quinnate, more or less silky-hirsute; divisions rhom-

bic-ovate, 3-cleft and coarsely toothed; inflorescence cymose; sepals greenish white, 1 cm. or less long; heads of fruit 1-2.5 cm. long, 12-15 mm. thick. Woods and river banks: N.S.—S.C.—Kans.—Wyo.—Alta. *Plain—Submont.* Je—Au.

9. **A. riparia** Fernald. Stem 6-10 dm. high, somewhat pubescent, 1-5-flowered; leaf-blades ternate or quinate; divisions lanceolate, cuncate at base, 3-cleft and toothed; inflorescence cymose; head of fruit subcylindric, 2-3 cm. long, 1 cm. thick. River banks: Me.—Va.—Alta. *Plain—Submont.* Je—Jl

10. **A. Richardsoni** Hook. Basal leaf-blades round-reniform, deeply 5-cleft into cuneate-obovate incised divisions; involucre of 3, dilated, cuncate, 3-lobed, dentate leaves; sepals sulphur-yellow, elliptic, 8-15 mm. long, heads of fruit subglobose; achenes comparatively few. Arctic and subarctic regions. Greenland—Hudson Bay—Alta.—Alaska. *Subalp.* My—Jl

11. **A. canadensis** L. Stem strigose, 2-6 dm. high, 1-3-flowered; leaf-blades 10-12 cm. wide, 3-5-parted; divisions oblanceolate, 3-cleft and toothed, involucral leaves similar but larger, often 15 cm. long or more, sessile and more deeply cleft; sepals obovate or oval, 12-18 mm. long, white; head of fruit globose. Low ground: Lab.—Md.—N.M.—Alta. *Plain—Submont.* My—Au.

12. **A. zephyra** A. Nels. Stem 1-4 dm. high; leaf-blades more or less silky-villous, but in age often glabrate, 5-8 cm. wide, ternate or quinate; divisions cuneate to broadly obovate in outline, twice cleft into obtuse lobes; involucral leaves much smaller, sessile and 3-cleft; petals white, broadly obovate, 10-15 mm. long; head of fruit about 15 mm. broad, spherical; achenes flat, broadly spatulate in outline. *A. narcissiflora* Am. auth. Alpine-arctic regions: Colo.—Wyo.—Alaska. *Mont.—Alp.* Jl—Au.

13. **A. Piperi** Britton. Stem 1.5-3 dm. high, slender, very sparingly appressed-silky; basal leaves ternate; middle lobe rhombic-obovate or rhombic-cuneate, coarsely toothed above the middle, 2-7 cm. long, the lateral ones broader, obliquely ovate, 2-cleft to about the middle; sepals elliptic-obovate to oval, about 15 mm. long, white, glabrous. Hillsides: Ida.—Wash. *Submont.* My—Jl.

2. PULSATILLA Adans. PASQUE-FLOWER, BLUE TULIP, WILD CROCUS, LION'S BEARD (Fruit).

Perennial scapose herbs, with a thick taproot and short caudex. Leaves basal, palmately or rarely pinnately divided or dissected. Bracts of the scape somewhat similar to the leaves, 3 in number, verticillate, often connate. Flowers mostly solitary. Sepals 5-7, colored blue, purple, or white. Petals wanting. Stamens numerous, the outer often changed into staminodia. Pistils numerous. Fruit of numerous achenes, with much elongated, persistent, plumose styles.

Flowers purple or violet, seldom white; involucral leaves sessile, palmately divided into linear lobes

Flowers white or tinged with purple, involucral leaves petioled, ternate and twice pinnately dissected

1. **P. ludoviciana** (Nutt.) Heller. Leaf-blades ternate and repeatedly dissected into linear divisions, 5-10 cm. in diameter, villous-hirsute or in age glabrate; scape 1-4 dm. high, villous; sepals ovate-oblong, 25-35 mm. long; achenes silky, their styles about 3 cm. long. *Anemone patens Nuttalliana* A. Gray. *P. hirsutissima* Britton. Prairies, plains, and hillsides: Ill.—Tex.—Utah—Wash.—Alaska. *Plain—Subalp.* Mr—S.

2. **P. occidentalis** (S. Wats.) Freyn. Leaf-blades ternate and then twice pinnate-dissected, sparingly silky-hirsute; scape 1-6 dm. high, silky-villous, sepals oval or oblong, 2-2.5 cm. long; achenes silky, in fruit reflexed, their style 3 cm. long or more. *Anemone occidentalis* S. Wats. On gravelly or stony hills and mountains: Alaska—Calif.—Mont.—Alta. *Submont.—Mont.* Je—Au.

3. THALICTRUM L. MEADOW RUE, MAID-OF-THE-MIST.

Perennial herbs, with rootstocks. Leaves alternate, ternately decomposed; petioles with dilated bases. Flowers perfect, dioecious, or polygamous, in panicles or racemes. Sepals greenish white, 4 or 5. Petals wanting. Stamens

numerous; filaments often clavate or dilated. Pistils few; stigmas elongate, unilateral. Achenes stipitate or sessile, ribbed or nerved.

Flowers perfect

Plant 2 dm or less (rarely 3 dm) high, achenes turgid, filaments filiform.

1. *T. alpinum*.

Plant 3-10 dm high; achenes flat and very oblique; filaments clavate.

2. *T. sparsiflorum*.

Flowers dioecious or polygamous

Achenes turgid, thick-walled, ribs thick and almost corky, separated by acute grooves.

Plants polygamous, stem-leaves subsessile, the basal ones petioled

Achenes, petiolules, and lower surfaces of the leaves decidedly viscid-pubescent.

3. *T. dasycarpum*.

Achenes, petiolules, and the lower surfaces of the leaves glabrous or slightly viscid-puberulent

4. *T. purpurascens*.

Plants dioecious, all leaves petioled.

Achenes equally acutish at both ends; leaves very thin and not strongly veined

5. *T. dioicum*.

Achenes more acute at the upper end than at the lower, leaves firm, strongly veined

6. *T. venulosum*.

Achenes more or less flattened, thin-walled, ribs not thick, separated by wide, shallow, rounded grooves

Achenes sessile.

Achenes more than twice as long as broad, slightly if at all oblique.

Achenes about 4 times as long as broad, 6-8 mm long, 1.5-2 mm wide.

7. *T. occidentale*.

Achenes less than 3 times as long as broad.

Achenes 6-8 mm long, 2.5-3.5 mm wide

8. *T. megacarpum*.

Achenes 4-5 mm long, 1.5-2 mm wide

9. *T. columbianum*.

Achenes not quite twice as long as broad, decidedly oblique.

10. *T. Fendleri*.

Achenes stipitate.

11. *T. stipitatum*.

1. *T. alpinum* L. Stem glabrous; leaves mostly basal, 2-10 cm. long, pinnate, with the lower primary divisions ternate; leaflets cuneate-obovate to orbicular, firm, 3-10 mm. long, 3-5-lobed at the apex; inflorescence usually a raceme; anthers oblong-linear; achenes few, lance-obovoid, turgid, with thick ribs. *T. scopulorum*, *T. cheilanthesoides*, *T. subspensum*, *T. leiophyllum*, and *T. durusculum* Greene. Bogs: Greenl.—Newf.—Colo.—Calif.—Alaska, n Eurasia. Mont.—Alp. Je—Jl.

2. *T. sparsiflorum* Turcz. Stem glabrous, leafy; leaves bi- or tri-ternate, the lower petioled, the uppermost sessile; leaflets thin, pulverulent-glandular beneath, cordate, usually 3-cleft and the divisions 3-lobed, 1-2 cm. long; achenes 6-12, half rhombic with a straight back, glandular-pulverulent, with about three faint ribs, 5-6 mm. long, 3-4 mm. wide. *T. utahense* Greene. Moist places: Alaska—Calif.—Colo.—Hudson Bay; n Asia. Submont.—Mont. Je—Au.

3. *T. dasycarpum* Fisch. & All. Stem tall, 5-20 dm. high; leaves 3-5 times ternate; leaflets ovate or obovate, rather thick, dark green above, paler and strongly veined beneath; achenes obliquely oblanceolate, about 5 mm. long and 2 mm. wide. Copses and meadows: Ont.—Ia.—n N.M.—Sask. Plain—Mont. Je—Au.

4. *T. purpurascens* L. Stem tall, glabrous, 3-20 dm. high; leaves 3-5 times ternate, glabrous or nearly so; leaflets rather thin, ovate or subcordate at the base, rather light green; achenes obliquely oblanceolate, 4-5 mm. long and about 2 mm. wide. Copses and woodlands: N.S.—Fla.—Colo.—Sask. Plain—Submont. Je—Au.

5. *T. dioicum* L. Stem 3-6 dm. high, slender; leaves 3-4 times ternate; leaflets 1-3 cm. long, thin, pale beneath, rounded or sometimes cordate at the base, with 3-9 rounded lobes; filaments filiform; achenes oblong, about 4 mm. long. Woods: Lab.—Ala.—Mo.—Sask. Boreal. My—Je.

6. *T. venulosum* Trelease. Stem 2-5 dm. high, glabrous; leaves 3-4 times ternate; leaflets rounded in outline, 5-15 mm. long, strongly veined, 3-5-lobed and crenate, bluish green, paler beneath; panicle narrow and dense; filaments filiform; achenes about 5 mm. long, oblong. *T. campestre* Greene. Open mountain woods: Man.—Colo.—Utah. Plain—Mont. Je—Au.

7. **T. occidentale** A. Gray. Stem 3-10 dm. high; leaves 3-4 times ternate; leaflets very thin, orbicular to obovate-cuneate, 3-lobed and coarsely crenate, 1-3 cm. long; filaments filiform; achenes lanceolate, tapering at both ends, 6-8 mm. long, 1.5-2 mm. wide. Woods and copses: B.C.—Calif.—Utah.—Alta. *Submont.*—*Mont.* Je—Au.

8. **T. megacarpum** Torr. Plant closely resembling the preceding; stem 3-8 dm. high; leaves 3-4 times ternate; leaflets thin, pale beneath; filaments filiform; achenes lance-oblong, acute at both ends, 6-7 mm. long, 2.5-3.5 mm wide, with more prominent ribs than in the preceding. *T. propinquum* and *T. omissum* Greene. Copses, woods and river banks: Ida.—Utah—Colo.—*Mont Submont.*—*Mont.* My—Au.

9. **T. columbianum** Rydb. Stem 3-5 dm. high; leaves 3-4 times ternate; leaflets rather crowded, thick and veiny, 1-2 cm. long, cuneate to nearly orbicular, 3-lobed and deeply toothed; inflorescence narrow; achenes oblong- or ovate-lanceolate, somewhat flattened, 4-5 mm. long, 1.5-2 mm. wide. Meadows: Wash.—Ore.—Wyo.—Ida. *Submont.*—*Mont.* Jl—Au.

10. **T. Fendleri** A. Gray. Stem 3-6 dm. high; leaves 3-4 times ternate, glabrous; leaflets obliquely orbicular or subcordate, pale beneath, 1-2 cm. long, 3-lobed and crenate; inflorescence open and leafy; filaments filiform; achenes obliquely obovate, 3-ribbed, with the median rib strong. Mountains: Wyo—N.M.—Ariz.—Utah. *Submont.*—*Mont.* Je—Au.

11. **T. stipitatum** Rydb. Stem 4-6 dm. high, glabrous, leafy; leaves 3-4 times ternate, glabrous, paler beneath, all except the very uppermost petioled, leaflets 1-2 cm long, orbicular, with a rounded or subcordate base, 3-lobed and crenate; inflorescence leafy and open; achenes short-stipitate, the body broadly and obliquely oblong-lanceolate, about 6 mm. long, 2.5-3 mm. broad, flat with slender ribs. Woods: c Colo. *Mont.* Jl.

4. **TRAUTVETTERIA** F. & M. FALSE BUGBANE.

Perennial herbs, with horizontal rootstocks and tall stems. Leaves mainly basal, palmately lobed, long-petioled. Flowers perfect, corymbose-paniculate. Sepals 3-5, petaloid, greenish white, caducous. Petals wanting. Stamens numerous, with white filaments. Pistils numerous, 1-ovuled. Achenes sharply angled, inflated, tipped with a minute style; stigma introrse. Embryo large; endosperm fleshy.

Styles in fruit about one-third as long as the body of the achenes; filaments broader than the anthers
 Styles in fruit less than one-fourth as long as the body of the achenes; filaments not broader than the anthers.

1. **T. grandis** Nutt. Stem 3-10 dm. high, glabrous up to the inflorescence; leaf-blades reniform in outline, 1-2 dm. wide, palmately 7-9-lobed and irregularly serrate; filaments clavate, 5-6 mm long; achenes ovoid, rounded at the base, 3 mm. long. *T. sanculifolia* Greene. Woods: B.C.—*Mont.*—Calif. *Mont.* Je—Au.

2. **T. media** Greene. Stem 5-10 dm. high, glabrous; leaf-blades reniform, 5-9-cleft; the divisions often again lobed and irregularly toothed; filaments slightly clavate, about 5 mm. long; achenes fully 3 mm. long, less rounded at the base. Mountain woods: N M.—s Utah. *Mont.* Jl—Au.

5. **CLÉMATIS** L. VIRGIN'S BOWER, WHITE CLEMATIS, TRAVELER'S JOY, PIPE-STEM.

Climbing vines. Leaves opposite, pinnately compound or decompound, with entire, toothed, or incised leaflets. Flowers in broad, paniculate cymes or rarely solitary, perfect, dioecious, or polygamo-dioecious. Sepals rather small, petaloid, usually white, valvate, without a border, spreading. Petals and staminodia wanting. Stamens numerous, spreading; anthers short and blunt. Pistils several or many. Fruit of 1-seeded achenes, with silky or plumose, elongate styles.

Plant dioecious; flowers white, paniculate

Inflorescence usually longer than the leaves, its branches and the pedicels strongly ascending, leaflets lanceolate or ovate-lanceolate, sepals oblanceolate.

1. *C. ligusticifolia*.

Inflorescence shorter than the leaves, its branches and the pedicels more spreading; leaflets broadly ovate, usually subcordate at the base; sepals spatulate

2. *C. brevifolia*.

3. *C. orientalis*.

Plant with perfect yellowish flowers, solitary in the axils.

1. *C. ligusticifolia* Nutt. A woody vine, 3-6 m. high; leaves pinnately 5-7-foliate; leaflets petiolate, in the typical form lanceolate to ovate, rounded or truncate at the base, usually more or less acuminate, 3-8 cm. long, sparingly strigose; cymes with nearly erect branches; sepals white, nearly 1 cm. long, oblong-oblanceolate; filaments of the staminate flowers linear-filiform, those of the pistillate flowers broader, linear, somewhat dilated, with sterile anthers; achenes numerous, obovate, pubescent; styles plumose, 4-5 cm. long. Very variable species. Copses and cañons among bushes: B.C.—N.D.—N.M.—Calif. *Plain*—*Submont.* My—Au.

2. *C. brevifolia* (Nutt.) Howell. A woody vine, 2-5 m. high, resembling the last; leaves pinnately 5-7 foliolate; leaflets broadly ovate, acute at the apex, usually cordate at the base, double-toothed, 2-5 cm. long, nearly glabrous, rather firm; inflorescence subumbellate or corymbiform, with more spreading short branches; sepals straw-colored, 8-9 mm. long; achenes obovate, pubescent; styles plumose, 2-3 cm. long. Among bushes: Wash.—Mont.—Utah—Ore. *Submont.* My—Jl.

3. *C. orientalis* L. Climbing vine, 3-5 m. high; leaves twice or thrice ternate; leaflets thin, shining, 3-parted with small, ovate, incised divisions; sepals yellow, tinged with green, somewhat reflexed; styles plumose. *C. crux-flava* Cockerell. (?) *C. aurea* Nels. & Mach. Among bushes: Ont.—N.M.—Ida.; escaped from cultivation, native of India.

6. VIORNA Reichenb. VASE-VINE, LEATHER-FLOWER, OLD MAN'S WHISKERS AND LION'S BEARD (fruit).

Climbing vines or (all ours) erect perennial herbs. Leaves opposite, in ours pinnately compound or decomposed. Sepals 4, rarely 5, valvate, petaloid, bluish or purplish, erect and connivent at the base or throughout. Petals and stamens wanting. Stamens numerous, erect; anthers long and narrow, pointed; filaments hairy. Pistils many. Fruit 1-seeded achenes, with long persistent, in ours plumose styles.

Sepals not or indistinctly dilated above

Calyx rounded-urceolate, sepals broadly ovate, merely the tips spreading

Leaf-segments ovate to ovate-lanceolate, 2-5 cm. long.

1. *V. Scottii*.

Leaf-segments linear to lanceolate, 1-2 cm. long.

2. *V. Bakeri*.

Calyx elongated-campanulate, sepals oblong-lanceolate, about one-fourth or more of their length spreading

Middle and upper leaves subsessile, thrice ternate, ultimate segments linear or linear-lanceolate.

3. *V. hirsutissima*.

Middle and upper leaves distinctly petioled, twice ternate; ultimate segments lanceolate

4. *V. Wyethii*.

Sepals decidedly dilated at the apex

Sepals acute or short-acuminate, plant in age glabrate; leaf-segments lanceolate.

5. *V. Jonesii*.

Sepals obtuse or merely acutish; plant permanently villous; leaf-segments linear.

6. *V. eriophora*.

1. *V. Scottii* (Porter) Rydb. Stem erect, 2-4 dm. high, more or less villous when young; leaves twice pinnately divided, spreading; peduncles about 1 dm. long; sepals purplish brown, 2.5-3.5 cm. long, more or less villous outside; achenes obovate, flattened, densely short-pubescent; their styles 4-5 cm. long. *Clematis Scottii* Porter. *C. Douglasii Scottii* Coulter. Hillsides: N.M.—S.D.—Wyo. *Submont.*—*Mont.* My—Jl.

2. *V. Bakeri* (Greene) Rydb. Stem erect, 3-6 dm. high, simple, slightly villous, strongly striate; leaves short-petioled, twice or thrice pinnate; sepals dark purplish brown, villous outside, less than 2 cm. long; fruit unknown. *C. Bakeri* Greene. Hillsides: Los Pinos, Colo.—N.M. *Submont.* My.

3. *V. hirsutissima* (Pursh) Heller. Stem simple, erect, 3-7 dm. high; lower leaves petioled, the earliest entire, the rest dissected, mostly thrice pinnate; sepals brownish purple, 3-4.5 cm. long; achenes obliquely ovate, densely canescent, their styles 5-6 cm. long. *C. hirsutissima* Pursh. *C. Douglasii* Hook Hillsides and valleys: Wash.—Wyo.—Mont. *Submont.*—*Mont.* My-Je.

4. *V. Wyethii* (Nutt.) Rydb. Perennial; stem simple, 2-4 dm. high, villous; leaves twice pinnately divided, with usually broader divisions than in the preceding; sepals dark brownish purple, 2.5-3.5 cm. long, villous outside; achenes obliquely ovate, canescent; their styles 3-5 cm. long. *C. Wyethii* Nutt. Hills. Mont.—Wyo.—Ida. *Submont.*—*Subalp.* Ap-Jl.

5. *V. Jonesii* (Kuntze) Rydb. Stems 3-6 dm. high; leaves twice pinnately divided, 1-1.5 dm. long, rather firm; segments 1-5 cm. long, acutish; calyx campanulate, brown; sepals 2-2.5 cm. long, ovate, the upper half with wavy dilated margins; achenes about 5 mm. long, densely silky; styles 4-5 cm. long. *Clematis Douglasii* var. *Jonesii* Kuntze. *Clematis plattensis* A. Nels. Hillsides and gulches: Colo.—Nev. *Submont.*—*Mont.* Je-Jl.

6. *V. eriophora* Rydb. Stems and leaves prominently white-villous, the former 3-5 dm. high; leaves distinctly petioled, twice pinnately divided; segments 1-3 cm. long; calyx villous, campanulate, about 3 cm. long; sepals oblong, the upper third spreading with dilated margins; achenes oblong, about 6 mm. long; tails about 4 cm. long. Foot-hills and cañons: N.M.—Wyo.—Utah. *Submont.* My-Je.

7. *ATRÁGENE* L. BELL RUE, PURPLE VIRGIN'S BOWER.

Perennial climbing or creeping vines. Leaves opposite, compound. Flowers large and showy, solitary in the axils or at the end of the branches. Sepals large, petal-like, mostly membranous, blue or purple, spreading from the base. Petals or staminodia small, spatulate, usually present. Stamens numerous, spreading; filaments pubescent, the outer ones dilated, anthers short. Pistils many. Fruit 1-seeded achenes, with persistent, long, plumose styles.

Leaves merely ternate.

Staminodia usually decidedly spatulate; leaflets variously toothed or cleft, not long-acuminate.

Lobes or teeth of the leaves rounded or obtuse at the apex; sepals ovate.

Lobes or teeth of the leaves acute or acuminate; sepals lanceolate.

Staminodia linear or none, leaflets entire or crenate above the middle, long-acuminate

Leaves twice or thrice ternate, staminodia usually linear or lacking.

Secondary leaflets merely toothed or cleft

Secondary leaflets broadly ovate, with broadly ovate teeth

Secondary leaflets lanceolate, with lanceolate or ovate-lanceolate lobes or teeth

Secondary leaflets divided to near the midrib.

1. *A. diversiloba*

2. *A. grosseserrata*

3. *A. columbiana*

4. *A. repens*

5. *A. pseudoalpina*

6. *A. tenuiloba*

1. *A. diversiloba* Rydb. A low vine; leaves glabrous or slightly hairy when young, ternate; leaflets ovate in outline, obtuse, 1-3 cm. long, the lateral ones usually 2-cleft, the terminal one 3-cleft; sepals red-purple, lanceolate, about 2.5 cm. long; staminodia about 15 mm. long, acute. Mountains: near Denver, Colo. *Submont.* Au.

2. *A. grosseserrata* Rydb. Trailing or climbing over bushes; leaves ternate; leaflets broadly ovate, oblique, somewhat cordate at the base, 3-4 cm. long, coarsely toothed and often somewhat lobed; sepals about 4 cm. long, 10-13 mm. wide, acute; staminodia about 18 mm. long, a little exceeding the stamens; achenes small, sparingly hirsute; styles about 3 cm. long, plumose throughout. Mountain meadows among bushes: Ida.—Mont.—Wash. *Submont.*—*Mont.* Je.

3. *A. columbiana* Nutt. Rather tall vine, climbing over bushes; leaves ternate; leaflets thin, 3-10 cm. long, obliquely cordate at the base; sepals purple or blue, 3-5 cm. long, lanceolate, acuminate; achenes rather densely pubescent, styles plumose, 4-5 cm. long. *A. occidentalis* Rydb., not Hornem. *Clematis*

verticillaris columbiana A. Gray. Woods and among bushes: B.C.—Alta.—Colo.—Utah—Wash. *Submont.*—Mont. My—Jl.

4. **A. repens** (Kuntze) Rydb. Plant trailing; leaves biternate, glabrous; leaflets subsessile or the terminal short-stalked, broadly ovate, 3–4 cm. long, abruptly short-acuminate; sepals ovate-lanceolate, about 4 cm. long, acute; staminodia linear; achenes about 5 mm. long, pubescent; styles about 4 cm. long. Cañons: Utah—Wyo. *Submont.* Jl.

5. **A. pseudoalpina** (Kuntze) Rydb. Vine climbing over bushes; leaves biternate; leaflets lanceolate to ovate-lanceolate, acuminate, 2–4 cm. long, deeply toothed or often 2–3-cleft; sepals lanceolate, 3–5 cm. long, purple or blue, rarely white; staminodia linear or often lacking; achenes nearly glabrous at maturity; styles 3–4 cm. long, plumose. *Clematis alpina occidentalis* A. Gray. *C. pseudoalragene pseudoalpina* Kuntze. Hillsides among shrubs: Colo.—Utah—N.M. *Submont.*—Mont. Ap—Je.

6. **A. tenuiloba** (A. Gray) Britton. Mostly trailing vine; leaves biternate; secondary leaflets 1–3 cm. long, usually divided to near the midrib into lanceolate or ovate divisions; these more or less toothed, acuminate; sepals 2.5–3.5 cm. long, lanceolate, acuminate, blue or purple; achenes densely pubescent; styles 4–5 cm. long. Woods: S.D.—Colo.—Ariz.—Mont. *Submont.*—Subalp. My—Jl.

8. MYOSŪRUS L. MOUSE-TAIL.

Small acaulescent annual mud plants, with fibrous roots. Leaves basal, linear or filiform. Scapes 1-flowered. Sepals 5, rarely 6 or 7, long-spurred at the base. Petals 5–7, narrow, greenish yellow, or wanting, the claws nectariferous at the summit. Stamens 5–25. Pistils numerous, borne on a receptacle, which becomes elongated and cylindric at maturity. Achenes aristate or apiculate, numerous, 1-seeded, tardily dehiscent. Seeds suspended; embryo minute.

Achenes with a flat back, only slightly carinate, and tipped with a very short appressed beak. *1. M. minimus.*
Achenes strongly carinate on the back, tipped with a subulate, ascending beak.
Beak more than half as long as the achene proper; spike short and dense.

Beak very short; spike of the achenes long and slender. *2. M. aristatus.*
3. M. lepturus.

1. **M. minimus** L. Leaves filiform or nearly so, glabrous, 3–10 cm. long, blunt; scape 3–15 cm. long; sepals oblong, about 3 mm. long; spurs 1–2 mm. long; petals spatulate, long-clawed, sometimes lacking; fruiting spike 3–6 cm. long. In mud and shallow water: Ont.—Fla.—Calif.—Wash.; Eu. and n Africa. *Plain*—*Submont.* Ap—Je.

2. **M. aristatus** Geyer. Leaves filiform to narrowly linear-oblongate, blunt, scape 2–6 cm. long; sepals 2 mm. or less long; spurs about 1 mm. long; petals often lacking; carpel-spike 3–20 mm. long. (?) *M. nitidus* Eastw. In mud. B.C.—Mont.—Neb.—N.M.—Calif. *Plain*—*Mont.* Ap—Jl.

3. **M. lepturus** (A. Gray) Howell. Leaves filiform, 3–5 cm. long, glabrous; scape 3–10 cm. long; sepals about 2 mm. long; spurs about 1 mm.; carpel-spike 1–4 cm. long, slender. In mud and dry ponds: B.C.—Sask.—Mont.—Calif. *Plain*—*Submont.* My—Je.

9. BATRACHIUM S. F. Gray. WHITE WATER CROWFOOT.

Perennial aquatic herbs, with floating or creeping stems. Leaves alternate, palmately dissected or lobed, the submerged ones usually with filiform divisions. Flowers perfect, solitary, borne opposite the leaves. Sepals and petals usually 5, the latter white, sometimes with a yellowish base, bearing a small pit on the claw. Stamens several or numerous. Pistils many in a globular head. Achenes oblique, compressed, not margined, transversely wrinkled, short-beaked or almost beakless.

Leaves all submerged and finely dissected, with linear to capillary divisions.

Divisions of the leaves rather few, flat, 0.5–1.5 mm. wide.

Divisions of the leaves very slender, filiform or capillary.

Beak of the achenes nearly 1 mm. long.

1. *B. Porteri.*

2. *B. longirostre.*

Beaks of the achenes minute or none.

Petals 5-7 mm. long, broadly obovate; stamens many.

Primary divisions of the leaves 1-1.5 cm. long, rather rigid, scarcely collapsing when withdrawn from the water. 3. *B. trichophyllum*

Primary divisions of the leaves 1.5-3 cm. long, flaccid, collapsing when withdrawn from the water. 4. *B. flaccidum*.

Petals less than 5 mm. long, oblong-obovate; stamens 5-12. Stem slender, but not capillary, leaves not very flaccid.

5. *B. Drouetii*.

6. *B. confervoides*

Upper leaf-blades floating, reniform, merely cleft or toothed, the rest submersed and with capillary divisions. 7. *B. Grayanus*.

1. *B. Porteri* Britton. Stem 1 m. long or more; leaves all submerged; petioles 1-2 cm. long, dilated at the base; blade 4-5 cm. broad, repeatedly ternately divided, with narrowly linear, attenuate divisions; petals 3-4 mm. long; achenes 6-12 in a head, obliquely oval, nearly 2 mm. long, almost beakless. In water: Henry's Fork, e Ida.

2. *B. longirostre* (Godr.) F. Schultz. Stem very leafy and branched; petioles very short; blades 2-4 cm. broad; petals broadly ovate, 5-7 mm. long, head of fruit globose; achenes many, about 1.5 mm. long. *Ranunculus circinatus* A. Gray, in part, not Sibth. Ponds and slow streams: Ont.—N.Y.—N.M.—Utah—S.D. *Plain*. Je—Au.

3. *B. trichophyllum* (Chaix.) Bosc. Stem 3 dm. long or more; petioles 1-1.5 cm. long; blades 2-3 cm. wide, usually with spreading divisions; petals about 8 mm. long; head of achenes globose, 4 mm. thick; achenes many, about 1.5 mm. long. Ponds and slow streams: N.S.—N.C.—Calif.—B.C.; Mex.; Eurasia. *Plain*—*Mont*. Je—S.

4. *B. flaccidum* (Pers.) Rupr. Stem long and slender; leaves rather distant; leaf-blades 3-5 cm. broad, with usually ascending segments; petals 5-8 mm. long, white; head of fruit about 4 mm. wide; achenes often nearly 2 mm. long. In streams, rarely in ponds: Lab.—N.C.—L. Calif.—Wash. *Plain*—*Mont*. My—S.

5. *B. Drouetii* (F. Schultz) Nym. Similar in habit to *B. trichophyllum*, but more slender; leaf-blades 1.5-3 cm. wide; petals 3-5 mm. long; head of achenes about 4 mm. thick, globose; achenes about 1.5 mm. long. In streams: Vt.—R.I.—N.M.—L. Calif.—Alaska; Eurasia and Africa. *Plain*—*Submont*. Je—S.

6. *B. confervoides* Fries. Stem 1-2 dm. long, very slender; leaf-blades 2-4 cm. wide; petals about 3 mm. long, oblong; achenes about 1 mm. long. In cold pools and lakes: Man.—Colo.—Alaska; Eu. *Mont*. Au.

7. *B. Grayanus* (Freyn) Rydb. Stem long and slender; submerged leaves short-petioled, finely dissected into capillary divisions, 3-8 cm. in diameter; floating leaves with petioles 2-3 cm. long; blades reniform, 1-3 cm. broad, 3-cleft; middle lobe cuneate, usually 3-lobed; lateral lobes broadly cuneate-obovate, usually twice 2-lobed; petals 5-7 mm. long, obovate; achenes hairy, nearly 2 mm. long. *Ranunculus aquatilis* A. Gray, not L. *R. Grayanus* Freyn. In water: Alaska—*Mont*.—Calif. *Submont*. Ap—Jl.

10. RANUNCULUS (Tourn.) L. CROWFOOT, BUTTERCUP.

Annual or most all of ours perennial herbs, with a cluster of fleshy-fibrous roots. Leaves alternate, entire, lobed, divided or dissected. Flowers solitary or cymose. Sepals mostly 5, deciduous. Petals 5 or more, in ours yellow, each with a nectariferous pit and a scale at the base of the blade. Pistils several or many, 1-ovuled. Achenes flattened, smooth, papillose, or echinate, tipped with the style, not striate.

Achenes smooth.

Leaves linear to oval, entire, or merely denticulate or crenate, none divided or cleft

I. FLAMMULAE

Some of the leaves at least cleft.

Sepals black-hairy.

II. NIVALES.

Sepals not black-hairy.

Some of the basal leaves entire.

Basal leaves linear or divided into 3 linear divisions.

V. DIOTATI.

- Basal leaves elliptic to reniform.
None of the leaves entire.
- Neither floating water plants nor creeping mud plants, if rooting at the nodes, the leaves not palmately lobed or dissected.
- Achenes turgid, marginless.
- Petals much exceeding the sepals.
- Basal leaves not divided to the base.
- Leaves all divided to the base; achenes glabrous.
- Leaves ternate, with simple linear divisions; plants very low, 0.5 dm. or less.
- Leaves 2-3 times ternate; plants 5-20 cm. high.
- Petals scarcely exceeding the sepals.
- Plants low, less than 1 dm. high.
- Plants taller, 3-6 dm. high.
- Achenes compressed, with a distinct margin.
- Beak of the achenes strongly hooked, beads of fruit globose.
- Beak of the achenes straight or nearly so, achenes in ours glabrous.
- Beak short.
- Leaves, at least the basal ones, pinnately ternate, the terminal division at least petioled.
- Leaves palmately divided.
- Beak long.
- Immersed aquatic or creeping mud plants, with palmately lobed, divided, or dissected leaves.
- Achenes prickly; annuals.
- I. FLAMMULAE.
- Plants rooting at the nodes.
- Stem filiform, prostrate, petals about 3 mm. long.
- Stem not filiform, at first ascending, petals about 5 mm. long.
- Plants erect or ascending, not rooting at the nodes.
- Leaves appressed-pubescent on the lower side.
- Leaves glabrous.
- Blades of the basal leaves acute at the base.
- Petals spatulate or oblong, usually 6-8, 6-8 mm. long.
- Petals obovate, usually only 5.
- Petals 7-10 mm. long, plants over 2 dm. high; leaves not very thin.
- Petals 5-6 mm. long; plant low, seldom 2 dm. high; leaves very thin.
- Blades of the basal leaves cordate or at least rounded at the base.
- II. NIVALES.
- Leaf-blades spatulate or elliptic, 2-4-toothed at the apex.
- Leaf-blades of the basal leaves reniform or flabelliform, 3-5-lobed.
- III. GLABERRIMI.
- One species.
- IV. AFFINES.
- Achenes pubescent, with a short recurved beak; heads oblong to cylindric.
- Some of the basal leaf-blades merely crenate, the rest mostly 3-cleft at the apex, with a narrow middle lobe.
- Sepals densely villous.
- Petals broadly obovate, about 1 cm. long.
- Petals wanting.
- Sepals not densely villous; petals oblong-obovate, 3-6 mm. long.
- Petals 5-6 mm. long; heads of achenes oblong.
- Petals 3-5 mm. long; heads of achenes cylindric.
- Basal leaf-blades digitately or pedately cleft with acute lobes.
- Basal leaf-blades reniform or rounded-cordate.
- Basal leaf-blades cuneate-flabelliform.
- Achenes glabrous; beak straight, usually slender.
- Plant glabrous, except the more or less villous sepals.
- Petals 7-12 mm. long, lobes of the basal leaves acutish.
- Basal leaf-blades cuneate-flabelliform, head of achenes somewhat oblong, 5-10 mm. long.
- Basal leaf-blades cleft half way down or less.
- Basal leaf-blades cleft more than half way down.
- Basal leaf-blades reniform or at least truncate at the base, divided more than half way down; heads of achenes globular.
- Petals 4-8 mm. long; lobes of the basal leaves obtuse or rounded.
- Heads of fruit decidedly oblong; basal leaf-blades orbicular, seldom reniform, the earliest not cleft more than half way down.
- Leaves thick, petals about 4 mm. long.
- Leaves thin, petals about 6 mm. long.
- Heads of achenes spherical or nearly so; basal leaf-blades decidedly reniform, cleft deeper than half way down.
- III. GLABERRIMI.
- IV. AFFINES.
- V. DIGITATI.
- VI. TRITERNATI.
- VII. PYGMAEI.
- VIII. ABORTIVI.
- IX. RECURVATI.
- X. REPENTES.
- XI. ACRES.
- XII. HISPIDI.
- XIII. MULTIFIDI.
- XIV. MURICATI.
1. *R. repens*.
2. *R. unalaschensis*.
3. *R. microlonchus*.
4. *R. alismaefolius*.
5. *R. Bolanderi*.
6. *R. alismifolius*.
7. *R. Populago*.
8. *R. Macauleyi*.
9. *R. nivalis*.
10. *R. glaberrimus*.
11. *R. cardiophyllus*.
12. *R. apetalus*.
13. *R. inamoenus*.
14. *R. affinis*.
15. *R. saxicola*.
16. *R. erimius*.
17. *R. Suksdorffii*.
18. *R. utahensis*.
19. *R. alpeophilus*.

Lobes of the upper stem-leaves elliptical, oval or obovate.

20. *R. Eschscholtzii*

Lobes of the upper stem-leaves linear to oblong

Stem about 2 dm. high, lateral lobes of the basal leaves 2-3-toothed

21. *R. Heilers*

Stem less than 1 dm. high; lateral lobes of the basal leaves 4-5-toothed.

22. *R. vericundus*

Plant more or less pubescent.

23. *R. ovalis*.

V. DIGITATI.

One species.

24. *R. Jovis*.

VI. TRITERNATI.

Plant less than 1 dm. high; petals about 5 mm. long; segments of the leaves very short, 3-5 mm. long, beak recurved

25. *R. Drummondii*

Plant usually more than 1 dm. high, petals 5-18 mm. long, segments of the leaves 1 cm. or more long; beak slender, not recurved

Primary divisions of the basal leaves petiolate, segments linear, somewhat narrowed

26. *R. stenolobus*

downward; stems usually several-flowered, roots fibrous

27. *R. adoneus*

Primary divisions of the basal leaves sessile, segments narrowly linear, almost filiform, not narrowed downward, stems 1-2-flowered; roots fleshy-fibrous.

VII. PYGMAEI.

Sepals glabrous or nearly so; lateral lobes of the basal leaves 2-3-toothed.

28. *R. pygmaeus*.

Sepals copiously pubescent, lateral lobes of the basal leaves 4-5-toothed

22. *R. vericundus*

VIII. ABORTIVI

Basal leaves, at least some of them, merely crenate.

Achenes pubescent; heads oblong to cylindrical.

Petals present; sepals not petaloid

13. *R. micropetalus*

Petals wanting; sepals with petaloid margins

29. *R. apetalus*.

Achenes glabrous, with a minute beak, heads subglobose.

Basal leaf-blades cordate at the base, plant glabrous.

30. *R. abortivus*

Basal leaf-blades rarely cordate at the base, plant, especially the stem, with spreading hairs

31. *R. micranthus*

All the leaves divided or lobed, annuals.

32. *R. scleratus*.

IX. RECURVATI

Flowers small; petals only 2-5 mm. long, basal leaf-blades divided into 3 rhombic or cuneate-obovate, cleft divisions.

Petals 2-3 mm. long.

Stem glabrous; achenes glabrous.

33. *R. Douglasii*

Stem hairy, achenes usually hirsute when young.

34. *R. Bongardi*.

Petals 4-5 mm. long; achenes glabrous

35. *R. Earlei*

Flowers larger, petals 5-12 mm. long; basal leaves often bilaterately cleft into linear, lanceolate, ovate, or cuneate divisions, achenes glabrous.

Pubescence of the stem appressed.

36. *R. acrisiformis*

Pubescence of the stem spreading.

Stem low and slender, seldom more than 3 dm. high; petals oblong to oval

37. *R. occidentalis*

Stem tall, 5-10 dm. high, petals broadly obovate.

38. *R. montanensis*

X. REPENTES.

Petals less than 1 cm. long.

Plant glabrous or nearly so.

39. *R. oreganus*.

Plant decidedly pubescent

Heads of achenes decidedly oblong, about 5 mm. thick.

40. *R. pennsylvanicus*

Heads of achenes globose, 7-12 mm. thick.

Plants not stoloniferous, primary segments of the leaves cuneate at the base, beak half as long as the body of the achene

41. *R. Macounii*

Plant producing long lateral branches, rooting at the nodes; primary segments of the lower leaves more or less truncate or subcordate at the base, beak one-third as long as the body of the achene.

42. *R. rivularis*

Petals more than 1 cm. long, stem creeping.

43. *R. repens*.

XI. ACRES.

One species.

44. *R. acris*.

XII. HISPIDI.

Petals obovate; divisions of the leaves lanceolate or ovate

45. *R. platyphyllus*

Petals elliptic; divisions at least of the upper leaves linear.

46. *R. orthorhynchus*

XIII. MULTIFIDI.

Leaves deeply cordate at the base, their primary divisions lobed or dissected; style about two-thirds as long as the achene.

Achenes callous-margined

47. *R. delphinifolius*.

Achenes marginless.

Stem glabrous.

48. *R. Purshii*.

Stem pubescent.

49. *R. limosus*.

Leaves truncate or slightly cordate at the base, their primary lobes entire or merely crenate; styles minute.

Floating water plants, at least some of the leaves cordate at the base.

Rooting mud plants; none of the leaves cordate at the base.

50 *R. intertextus*.

51. *R. hyperboreus*.

XIV. MURICATI.

One species.

52. *R. arvensis*.

1. *R. reptans* L. Stem filiform, 1-3 dm. long; leaves 1-5 cm. long, linear-filiform and glabrous to oblanceolate and strigose (var. *strigosus* Freyn); peduncles 1-3 cm. long, filiform; petals obovate, 2-4 mm. long; head of fruit spherical; achenes glabrous, with a minute beak. *R. flammula reptans* E. Meyer. Shores: Lab.—N.J.—N.M.—Ore.—Alaska. Plain—Mont. My-S.

2. *R. unalaschensis* Bess. Stem 3-6 dm. long, at first ascending, later decumbent and rooting at the nodes; leaves 4-10 cm. long, petioled, sparingly strigose or glabrous; blade lanceolate or oblanceolate, sometimes more than 1 cm. wide; petals obovate, 5-7 mm. long; head of fruit globose; achenes glabrous, with a minute beak. *R. Flammula intermedius* Hook. Shores and wet pastures: Alaska—Ida.—Calif.—Ont.—(? Newf.) Submont. My-Jl.

3. *R. microlonchus* Greene. Stem 7-15 cm. high; basal leaves slender-petioled; blades narrowly lanceolate, entire, 3-5 cm. long; cauline leaves few, relatively broader; flowers about 8 mm. broad; petals 5-8, obovate; achenes few in a depressed globose head, obliquely obovoid, tipped with a stout style, glabrous. Wet places: n Ida. Au.

4. *R. alismaefolius* Geyer. Stem glabrous or slightly hairy on the peduncles, 1-2 dm. (seldom 3 dm.) high, with rather spreading branches; basal leaves 1 dm. or less long, glabrous, petioled, oval to lanceolate, entire or denticulate; cauline leaves subsessile or short-petioled, lanceolate; petals obovate-oblong, 6-8 mm. long; head of achenes depressed-globose; achenes glabrous; beak subulate, curved. *R. calthaefolius* Greene. *R. unguiculatus* Greene, a form with somewhat clawed petals. Wet cold soil, below the snow or in open woods: Wyo.—Colo.—Nev.—Wash. Mont.—Subalp. Je-Au.

5. *R. Bolanderi* Greene. Stem stout, 3-10 dm. high, glabrous, or the peduncles strigose; basal leaves 1-2 dm. long, petioled, glabrous, lanceolate, thick, callous-denticulate or entire; stem-leaves similar, subsessile; petals 5, broadly obovate, 7-10 mm. long; achenes in a globose head, numerous, nearly 3 mm. long, with a subulate slightly curved beak. Wet places and shallow water: B.C.—Ida.—Calif. Submont. Ap-Je.

6. *R. alismellus* (A. Gray) Greene. Stem 1-2 dm. high, slender; basal leaves 1 dm. long or less, glabrous, long-petioled, oval to elliptic, acute at both ends; stem-leaves similar; petals obovate, 5-6 mm. long; head of fruit globose, 4-5 mm. broad, glabrous, with a subulate beak. *R. alismaefolius alismellus* A. Gray. Wet meadows and along streams: Wash.—Mont.—Wyo.—Calif. Submont.—Mont. Je-Au.

7. *R. Populago* Greene. Stem 1.5-2 dm. high, glabrous, slender; basal leaves long-petioled, glabrous; blades about 2 cm. wide, oval, to nearly round, cordate or rounded at the base, 2-3 cm. long, subentire, thin; stem-leaves short-petioled or subsessile, ovate, obtuse; petals 5-6, oblong-obovate; achenes glabrous, in a globose head. *R. Cusickii* M. E. Jones. Mountains: Ore.—Ida.—Wash. Submont. Jl-Au.

8. *R. Macauleyi* A. Gray. Stem 1-1.5 dm. high, glabrous or sparingly hairy above, the base surrounded by the remnants of old leaves; basal leaves thick, 0.5-2 cm. wide, petioled, glabrous; blades oblong or elliptic or spatulate, few-toothed at the apex; stem-leaves oblong-cuneate, sessile; petals broadly obovate, deep yellow; heads of achenes ovoid, about 5 mm. broad; achenes glabrous; beak 0.5 mm. long, subulate, nearly straight. Alpine peaks among rocks: s Colo.—n N. M. Mont.—Subalp. Je-Jl.

9. *R. nivalis* L. Stem more or less black-hairy, at least above; basal leaf-blades 0.5-2 cm. wide, reniform or flabelliform, usually 3-cleft; middle lobe entire or 3-toothed and the lateral ones 2-4-toothed; petals about 1 cm. long, broadly

obovate; head of fruit ovoid; achenes glabrous; beak about 1 mm. long. Arctic regions and alpine summits: Greenl.—Alta.—Alaska; Eurasia. *Alp.* Je—Au.

10. *R. glaberrimus* Hook. Stem 1 dm. high or less, glabrous, more or less fleshy; basal and lower cauline leaves petioled, thick, glabrous; blades reniform to rounded-oval, usually more or less 3-lobed at the apex; upper stem-leaves cuneate or oblanceolate, entire or 3 cleft; petals rounded-oval, 8–12 mm. long, heads of achenes globose; achenes glabrous, with an only slightly curved beak. *R. ellipticus* Greene, a form with thinner, more entire basal leaves. Wet places: Wash.—Mont.—N.M.—Calif. *Plain*—*Submont.* Mr—My.

11. *R. cardiophyllus* Hook. Stem 1.5–3 dm. high, more or less villous; basal leaves petioled, thick, pubescent when young; blades 2–4 cm. wide, reniform or cordate; stem-leaves divided into linear lobes; heads of achenes usually oblong or ellipsoid. *R. affinis validus* A. Gray. Wet meadows, bogs, and along streams: Sask.—Neb.—Colo.—Wash.—Alta. *Plain*—*Mont.* My—Au.

12. *R. inamoenus* Greene. Stem 2–3 dm. high, sparingly silky or in age glabrate; basal leaves petioled; blades 2–5 cm. wide, from orbicular to flabelliform or obovate in outline, the later leaves sometimes pedately 5-divided, with oblanceolate-cuneate divisions; stem-leaves 3-divided, with cuneate or oblanceolate divisions, or the upper with linear lobes; sepals sparingly pubescent; petals oval; heads of achenes 1 cm. long or less, over 5 mm. thick. *R. affinis* A. Gray, not Hook. Meadows and along streams: Mont.—N.M.—Utah—Ida. *Submont.*—*Mont.* My—Au.

13. *R. micropetalus* (Greene) Rydb. Stem slender, 2–3 dm. high, sparingly hairy or glabrate; leaves similar to those of the preceding, but usually thinner; petals light yellow; heads of achenes in well-developed specimens often 2 cm. long, about 4 mm. thick. *R. affinis leiocarpus* S. Wats., in part, not Trautv. *R. affinis micropetalus* Greene. Wet meadows and along streams: Colo.—Utah—Ariz.—N.M. *Submont.*—*Subalp.*

14. *R. affinis* R. Br. Stem slender, 1.5–3 dm. high, sparingly silky or glabrate; basal leaf-blades 2–4 cm. wide, the earliest 3-cleft and coarsely toothed or rarely merely toothed, the rest pedately divided into cuneate to oblong or linear, cleft segments; stem-leaves sessile, with linear divisions; petals oval; head of fruit oblong or ovoid, 5–10 mm. long. (?) *R. oreogenes* Greene. Bogs and wet meadows: Baffins Bay—Sask.—Colo.—Alaska. *Subalp.*—*Mont.* My—Au.

15. *R. saxicola* Rydb. Stem about 1 dm. long, decumbent or ascending, glabrous; basal leaf-blades 2–4 cm. wide, 3-cleft, the middle lobe narrow, entire or slightly 3-toothed, the lateral ones very oblique, coarsely 3–4-toothed; stem-leaves sessile, pedately 3–7-cleft into linear lobes; sepals obovate, half as long as the broadly obovate petals; achenes usually more or less pubescent. Among rocks in the mountains: Alta.—Mont.—Wyo.—Utah. *Mont.* Je—Jl.

16. *R. eximius* Greene. Stem glabrous or nearly so, 1–2 dm. high, erect; basal leaf-blades 2–4 cm. wide, pedately 3–7-cleft, with lanceolate divisions; stem-leaves sessile, with linear divisions, sepals oval or oblong; petals broadly cuneate-obovate, 10–12 mm. long, often overlapping. Below snowdrifts: Mont.—Colo. *Mont.*—*Subalp.* Jl—S.

17. *R. Suksdorfii* A. Gray. Stem about 1 dm. high, glabrous; basal leaf-blades 1.5–3 cm. wide, deeply 3–5-cleft, with cleft acute divisions; petals round-obovate, retuse, 8–12 mm. long. Damp ground in the mountains: Wash.—Alta.—Mont. *Mont.*—*Subalp.* Je—Au.

18. *R. utahensis* Rydb. Stems 1–2 dm. high, branched above; basal leaf-blades almost orbicular, rather thick, crenate or round-lobed; stem-leaves sessile, deeply cleft or divided into 4–5 oblong or elliptic, obtuse segments; sepals elliptic to obovate, at last reflexed; petals exceeding the sepals; beak rather short. Wet places in the mountains: Utah. *Mont.* Jl.

19. *R. alpeophilus* A. Nels. Stem 1.5–3 dm. high, branched above; basal leaf-blades 1.5–4 cm. wide, orbicular or flabelliform, the later ones often deeply 3-lobed, with a narrow middle lobe; divisions of the sessile upper stem-leaves

linear; petals oblong to elliptic, 5-6 mm. long; beak short. Wet places and open woods: Mont.—Colo.—Utah—Ida. *Mont.*—*Subalp.* Je—Au.

20. *R. Eschscholtzii* Schlecht. Stem 1-3 dm. high; basal leaf-blades 1-3 cm wide, 3-5 parted and again cleft; lower stem-leaves similar, but short-petioled; petals obovate, often retuse, 6-8 mm. long; head of fruit globose to oblong; *R. ocreatus* Greene, an undeveloped form, with rather large stipules. Wet places: Alaska—Alta.—Colo.—Calif. *Mont.*—*Alp.* Je—Au.

21. *R. Helleri* Rydb. Stem slender, 1-2 dm. high; blades of basal leaves 1-3 cm. wide, 3-cleft, often to near the base, and again cleft; lower stem-leaves similar, but more divided; petals 6-7 mm. long, oblong or obovate; head of fruit almost globose. Bogs: Ida.—Mont.—Wyo. *Mont.*—*Subalp.* Jl—Au.

22. *R. vericundus* B. L. Robins. Stem 1-3-flowered, ascending, 5-10 cm. high, glabrous or villous above; basal leaf-blades reniform, 3-cleft; middle segment 3-lobed; stem-leaves divided into 3-4 oblong divisions; petals about 5 mm long, exceeding the hairy sepals; head of fruit slightly oblong. Perhaps not distinct from the arctic *R. Sabini* R. Br. Wet places: Mont.—Wash. *Subalp.* Jl—Au.

23. *R. ovalis* Raf. Stem 0.5-3 dm high, more or less villous, especially when young; basal leaf-blades 1-3 cm. wide, from reniform or orbicular to rhombic-oval, crenate or round-lobed, some occasionally cleft, hairy when young; upper stem-leaves sessile, with linear or oblong divisions; sepals villous; petals obovate to oblong-cuneate, 4-6 mm. long; head of fruit globose; beak short. *R. rhomboideus* Goldie. *R. brevicaulis* Hook. Meadows: Lab.—Que.—Colo.—Alta Plain—Submont. My—Je.

24. *R. Jovis* A. Nels. Roots tuberous; stem 3-4 cm. high, glabrous; basal leaf-blades divided into 3-4, linear or oblanceolate, obtuse divisions, or entire; stem-leaf solitary, similar, sessile; sepals oval, glabrous; petals oblong-spatulate, 6-7 mm long; head of fruit globose; achenes glabrous, with a stout curved beak. *R. digitatus* Hook., not Willd. Moist ground, around snowdrifts: Ida.—Wyo.—Nev. *Mont.*—*Subalp.* My—Jl.

25. *R. Drummondii* Greene. Stem 5-10 cm. high; basal leaf-blades 2-3 cm wide, trimerately divided, with short oblong divisions, sparingly pubescent; stem-leaves similar or biternate; sepals oval, pubescent externally; petals oval; head of fruit globose; beak curved, a little shorter than the achene. *R. pedatifidus* Hook., not Smith. *R. Hookeri* Regel., not Schlecht. *R. Grayi* Britton, not *R. Grayanus* Freyn Barren summits. Canadian Rockies—Colo.

26. *R. stenolobus* Rydb. Stem 1-2 dm. high, usually branched; basal and lower cauline leaves petioled; blades three times ternately dissected into almost linear segments, which are 6-15 mm. long and 1-3 mm. wide; sepals oval, 4-5 mm. long; petals obovate, 7-8 mm. (rarely 9-11 mm.) long; head of achene spherical or slightly oblong, about 6 mm. broad. Alpine wet meadows: Utah—Wyo. *Mont.*—*Alp.* Jl—Au.

27. *R. adoneus* A. Gray. Stem 1-2 dm high, glabrous, 1-2-flowered; sepals oblong or elliptic, villous, 6-10 mm. long; petals broadly cuneate-obovate or flabelliform, usually overlapping, 10-18 mm. long; head of fruit slightly oblong, glabrous. Near snowdrifts: Wyo.—Colo.—Utah. *Mont.*—*Alp.* Jl—S.

28. *R. pygmaeus* Wahl. Stem 1-flowered, 2-5 cm. high, pubescent above, decumbent or ascending; leaf-blades reniform, 3-cleft, the lateral divisions of the basal leaves rounded, 2-lobed; petals 2-4 mm. long; head of fruit globose or ovoid; achenes glabrous; beak short. Wet grassy places: Greenl.—Canadian Rockies—Alaska; Eurasia. *Alp.* Jl—Au.

29. *R. apetalus* Farr. Stem 2.5-3 dm. high, glabrate below, villous above; basal leaf-blades orbicular to cordate in outline, crenate to deeply 5-9-lobed; cauline leaves divided to the base into cuneate incised divisions; sepals very concave, suborbicular, villous without; head of fruit oblong to ovoid. Roadsides: Alta. *Mont.*

30. *R. abortivus* L. Stem 1.5-6 dm. high, branched; basal leaf-blades 1-5 cm. wide, the later ones more or less deeply 3-cleft; upper stem-leaves sessile,

with linear or oblong divisions; sepals 2-3 mm. long, oblong; petals oblong. Wet places and open woods: Lab.—Fla.—Colo.—B.C. *Plain—Submont.* Ap-Jl.

31. *R. micranthus* Nutt. Stem 1.5-4 dm. high, branched; basal leaf-blades 1-4 cm. wide, the later 3-cleft or 3-divided, with oblanceolate-cuneate to obovate divisions; upper stem-leaves with linear divisions, sessile; flowers and achenes as in the preceding. *R. abortivus micranthus* A. Gray. Rich woods: Que.—Pa. Colo.—Sask. *Plain—Mont.* Ap-Je.

32. *R. sceleratus* L. Stem glabrous or nearly so, stout, more or less fleshy, 1.5-6 dm. high, freely branching; blades of the basal leaves 3-10 cm. wide, reniform, 3-cleft or 3-5-parted; segments round-lobed; upper stem-leaves sessile and with linear lobes; sepals 3-4 mm. long, hairy; petals elliptic; head of achenes oblong, with numerous small glabrous achenes; beak minute. *R. eremogenes* Greene. Shallow water and swamps: N.B.—Fla.—N.M.—S.D.; Eurasia. *Plain—Mont.* Ap-Au.

33. *R. Douglasii* Howell. Stem 3-7 dm. high, usually slender; blades of basal leaves 2-6 cm. wide, the middle division 3-cleft and toothed, the lateral ones twice 2-cleft; petals elliptic or spatulate, slightly exceeding the sepals, achenes rather few, glabrous. *R. tenellus* Nutt. *R. Nelsonii tenellus* A. Gray. *R. arcuatus* Heller. Wet places among bushes and open woods: Alaska—Mont—Colo.—Calif. *Submont.—Mont.* Ap-Jl.

34. *R. Bongardi* Greene. Stem stout, 4-8 dm. high; basal leaf-blades 3-10 cm. wide, more distinctly cordate at the base, with broader divisions, flowers and fruit as in the preceding, but the achenes usually hirsute when young. *R. occidentalis Lyallii* A. Gray. *R. Lyallii* Rydb. *R. Greenei* Howell. Open rich woods: Alaska—Mont.—Colo.—Ore. *Submont.—Mont.* Ap-Jl.

35. *R. Earlei* Greene. Like the two preceding; stem sparingly hairy or glabrous, 3-5 dm. high; leaves resembling those of *R. Bongardi*, petals elliptic-obovate, nearly twice as long as the sepals; achenes glabrous. Along mountain streams: Colo. *Mont.* Je.

36. *R. acriformis* A. Gray. Stem strict, 3-5 dm. high; leaf-blades 2-6 cm. wide, strigose, bi- or tri-ternately cleft into lanceolate or linear divisions, the uppermost merely ternate and sessile; sepals strigose, elliptic, about 6 mm. long; petals about 8 mm. long, broadly obovate, often retuse. Bogs and wet meadows: Ida.—Mont.—Colo. *Submont.—Mont.* Je-Au.

37. *R. occidentalis* Nutt. Stem usually ascending, hirsute, 2-3 dm. high, basal leaf-blades 2-4 cm. wide, densely pubescent, deeply 3-parted; terminal segment cuneate, 3-lobed and often toothed; lateral ones obliquely ovate, cleft and toothed; upper stem-leaves small and with linear divisions; petals 10-12 mm. long, more than twice as long as the sepals. *R. Nelsonii* A. Gray, in part. Open woods and low ground: Alaska—Mont.—Wyo.—Ore. *Submont.* Ap-Je.

38. *R. montanensis* Rydb. Stem stout, 3-5 dm. high, sparingly hirsute, basal leaf-blades 3-6 cm. wide, silky-hirsute, ternately divided, the divisions again parted and cleft into linear or lanceolate segments; upper stem-leaves sessile, with few linear segments; petals 7-10 mm. long. *R. MacCallae* Davis, a slender, less leafy form. Wet meadows: Alta.—Mont.—Ida. *Submont.—Mont.* Je-Au.

39. *R. oreganus* (A. Gray) Howell. Annual; stem erect, glabrous or with a few scattered hairs, 2-10 dm. high; leaves ternate, glabrous; divisions broadly ovate, deeply 3-lobed and serrate; petals obovate, 6-8 mm. long, twice as long as the reflexed sepals; heads of fruit oblong or oval. Wet places: Ore.—Ida.—Wash. *Submont.* Je-Au.

40. *R. pennsylvanicus* L. f. Mostly annual; stem erect, branching, hirsute, 3-8 dm. high; leaf-blades 5-15 cm. wide, very hairy, ternate; divisions petioled (especially the terminal one), ternately or pinnately divided, cleft and toothed, with lanceolate teeth; petals oblong, 2-4 mm. long, shorter than the reflexed sepals; beak broad, flat, less than half as long as the achene. Wet places and shallow water: N.S.—Ga.—N.M.—Wash.—B.C. *Plain—Submont.* Je-Au.

41. *R. Macounii* Britton. Stem 2-6 dm. high, usually very hirsute, at first usually erect, but later decumbent, branched and leafy; leaf-blades 5-15 cm. wide, ternate, hirsute, especially beneath; segments petiolate, especially the terminal one, rhombic-obovate, twice ternately cleft and toothed; petals obovate, 5-7 mm., equalling or somewhat exceeding the sepals. Wet meadows: Ont.—la.—N.M.—Utah—B.C. *Plain—Submont.* Je—Au.

42. *R. rivularis* Rydb. Stem hirsute, sometimes more than 1 m. long, rooting at the nodes and there producing plantlets; leaves ternate, 5-15 cm. wide; divisions petiolate, ovate, 3-cleft and coarsely toothed; petals rounded-obovate, about 4 mm. long, scarcely equalling the sepals. *R. repens* S. Wats., not L. River banks and along ditches: Nev.—Ariz.—Neb. *Plain—Submont.* Au.

43. *R. repens* L. Stem strigose or nearly glabrous, at first ascending, then decumbent and creeping; leaf-blades 3-8 cm. wide, ternate or the lower biternate, strigose or glabrate; divisions petiolate or the lateral ones sometimes subsessile, ternately or biternately cleft and toothed; petals broadly obovate or flabelliform, fully twice as long as the sepals; beak about one-fourth as long as the achene. Meadows and roadsides: Newf.—Va.—Utah—Wash.; adv. or nat. from Eu. *Plain—Submont.*

44. *R. acris* L. Stem erect, strigose or somewhat hirsute, or nearly glabrous, 3-9 dm. high; blades of the basal leaves 3-8 cm. wide, palmately 3-5-divided to near the base, more or less hairy; divisions broadly rhombic in outline, twice cleft into lanceolate lobes; petals broadly obovate, 1 cm. long or more, more than twice as long as the sepals; beak slightly curved, about one-fourth as long as the achene. Fields, meadows, and roadsides: Newf.—N.C.—Mo.—B.C.; nat. from Eu. *Plain—Submont.*

45. *R. platyphyllus* (A. Gray) A. Nels. Stem 3-6 dm. high, stout, striate, more or less hirsute; basal leaves 6-15 cm. wide, biternate or pinnate, with the lower divisions deeply 2-3 divided; divisions ovate in outline, cleft and toothed; divisions of the upper leaves lanceolate; sepals reflexed; petals 8-12 mm. long; heads of fruit oblong or subglobose, 12-18 mm. long and 10-12 mm. thick. *R. orthorhynchus platyphyllus* A. Gray. Wet places: Utah—Calif.—Wash. *Submont—Mont.* Ap—Au.

46. *R. orthorhynchus* Hook. Stem slender, hirsute to nearly glabrous; lower leaves pinnate; divisions cleft into oblong or lanceolate to linear lobes; petals elliptic, 8-12 mm. long; head of fruit globose. Wet ground: B.C.—Wyo.—Ore. *Submont.* My—Je.

47. *R. delphinifolius* Torr. Plant glabrous or slightly hairy when young; immersed leaves 5-10 cm. wide, finely dissected into capillary divisions, short-petioled; floating or emerged leaves 2-5 cm. wide, with longer petioles, repeatedly ternate, with linear lobes; leaves when growing in mud (var. *terrestris*) with much shorter and broader divisions, the lobes oblong or lance-ovate; petals 5-8 mm. long, obovate; head of fruit globose or slightly oblong. *R. multifidus* Pursh. Shallow water or mud: Me.—N.C.—Kans.—Utah—B.C. *Plain.* Je—Au.

48. *R. Purshii* Richards. Leaf-blades 1-3 cm. wide, cordate at the base, palmately divided in 3-7 more or less cuneate and lobed or cleft divisions, or the immersed ones dissected into filiform divisions; petals obovate, 4-5 mm. long; head of fruit globose, 5-6 mm. broad. Water or mud: N.S.—Ont.—Colo.—Ore.—Alaska. *Plain—Mont.* Je—S.

49. *R. limosus* Nutt. Leaf-blades 1-3 cm. wide, reniform in outline, palmately divided into more or less cuneate, cleft or lobed divisions; petals obovate, 4-5 mm. long; head of fruit globose, 4-5 mm. thick. Shallow water and mud: Mont—Wyo—Utah—Wash. *Submont.* Jl—Au.

Ranunculus limosus × *scleratus*, with the habit of *R. scleratus* and the leaves and pubescence of *R. limosus*, has been collected in Idaho.

50. *R. intertextus* Greene. Leaf-blades 1-3 cm. wide; rounded or slightly reniform, usually truncate at the base, palmately 3-7-lobed, with rounded entire lobes; petals obovate, 3-4 mm. long; head of fruit globose, 4-5 mm. thick; beak

minute. *R. natans* A. Gray, not C. A. Mey. Water: Colo.—Wyo.—Ida. Mont. Je—Au.

51. *R. hyperboreus* Rottb. Creeping mud plant, glabrous, usually less than 1 dm. long; leaf-blades less than 1 cm. broad, palmately 3–5-lobed, cuneate or rounded at the base; petals 2–3 mm. long; heads of achenes about 3 mm thick; beak minute. In mud: Greenl.—Lab.—Mont.—Alaska. Alp.—Subalp. Jl—Au.

52. *R. arvensis* L. Stem glabrous or sparingly pubescent, branched above, 3–4 dm. high; lower leaves petioled; blades cuneate, 3–5-lobed at the apex; the rest of the leaves short-petioled, twice or thrice ternate; primary divisions distinctly petioluled, the ultimate ones lanceolate or linear; sepals lanceolate, yellowish, membranous, long-pilose, 5 mm long; petals obovate, strongly veined, 6–7 mm. long; achenes few, obliquely ovate, compressed, 7–10 mm. long, spiny, beak 3–4 mm. long, flat, subulate, slightly curved. Waste places: N J.—O.—Utah; adv. from Eu. Je—Au.

11. *COPTIDIUM* Beurl.

Scapose perennial herbs, with slender, stoloniferous rootstocks. Leaves basal, petioled, with reniform, 3-parted blades, the divisions of which are again lobed. Scape 1-flowered. Sepals and petals 5, the latter yellow. Pistils rather few; styles long. Achenes obliquely ovate, the lower half enclosing the seeds, the upper portion empty, flattened, somewhat spongy.

1. *C. lapponicum* (L.) Gand. Stem scapiform, about 1 dm. high, filiform, glabrous, naked or with a single small leaf; basal leaf-blades 2–5 cm. wide, glabrous, ternately divided; divisions cuneate, 3–5-lobed; petals elliptic, about 5 mm. long, equalling the sepals; achenes about 5 mm long, 2 mm. wide, acute at both ends; beaks about 1.5 mm. long, hooked. *Ranunculus lapponicus* L. *Anemone nudicaulis* A. Gray. In moss: Lab.—Ont.—Minn.—Alta.—Alaska; Eu. Subalp.—Subarctic—Boreal. Je—Jl.

12. *BECKWITHTIA* Jeps.

Perennial herbs, with fibrous, fascicled roots. Leaves alternate, palmately dissected. Flowers perfect, solitary or few. Sepals marcescent, persistent. Petals large, broad and overlapping, white or rose-colored, nectariferous and with a rudimentary scale. Pistils many. Achenes thin-walled, utricular, compressed, narrowly scarious-margined, apiculate.

Scape 1-flowered, bractless, achenes 8–10 mm long, inflated **1. *B. Andersonii*.**
Scape 2–3-flowered, with a leaf-like bract, achenes 3–4 mm long, not inflated **2. *B. juniperina*.**

1. *B. Andersonii* (A. Gray) Jeps. Scape about 1.5 dm high; leaves fleshy, glabrous, bi- or triternate and parted into linear or lanceolate lobes; sepals broadly elliptic; petals orbicular, pink, 10–15 mm. long; achenes flattened, but inflated. *Ranunculus Andersonii* A. Gray. In rocky mountains: Ore.—Ida.—Utah—Calif. Submont.—Mont. Ap—My.

2. *B. juniperina* (Jones) Heller. Scape 2–3 dm. high; leaves basal, petioled, triternately divided, with short lanceolate lobes; sepals greenish, broadly obovate and enclosing the fruit; petals first white, veined with pink, becoming purple and 10–15 mm. long, broadly oval or orbicular; achenes flat. *Ranunculus Andersonii tenellus* S. Wats. Gravelly mountain sides: Utah. Mont. Ap.

13. *HALERPÉSTES* Greene.

Perennial herbs, with runners. Leaves mainly basal, petioled, cleft or toothed. Stem more or less scapiform. Flowers small, perfect, cymose or solitary. Sepals usually 5, spreading, tardily deciduous. Petals 5–12, each with a nectariferous pit at the base. Stamens and pistils numerous. Achenes compressed, thin-walled, longitudinally striate.

1. *H. Cymbalaria* (Pursh) Greene. Leaves glabrous, more or less fleshy; blades rounded-cordate or reniform, crenate, 4–18 mm. long; scapes 2–30 cm.

long; flowers 1-7; sepals yellowish green, oval or oblong, 3-7 mm. long; petals oblong-spatulate, slightly shorter; heads of fruit rounded-oblong, 6-16 mm. long. *Ranunculus Cymbalaria* Pursh. Wet sandy or alkaline soil: Lab.—N.J.—N.M.—Calif.—Alaska; Mex. and S. Am. *Son*—*Plain*—*Mont.* My.—Jl.

14. CYRTORHYNCHA Nutt.

Perennial herbs, with fascicled fleshy-fibrous roots. Leaves alternate, biternate, the basal ones long-petioled. Flowers cymose, perfect. Sepals membranous, yellowish, deciduous. Petals 5-9, narrow, pale yellow, bearing a callosity on the inner face, or wanting. Stamens 10-20. Pistils several; style recurved. Achenes oblong or ellipsoid, terete, prominently 10-costate, subcoriaceous, filled by the oblong erect seed.

Sepals spatulate or oblong-ovate, more or less contracted at the base

Leaf-segments thick, mostly acute, inflorescence corymbiform.

Leaf-segments thin, broad, inflorescence not corymbiform.

Sepals broadly round-ovate, not at all clawed, petals usually wanting.

1. *C. ranunculina*.

2. *C. rupestris*

3. *C. neglecta*.

1. *C. ranunculina* Nutt. Stems 1-2 dm. high; basal leaves long-petioled; blades 4-6 cm. broad; divisions deeply parted and cleft into lanceolate or oblong lobes, stem-leaves with scarious stipules, short-petioled and with linear lobes; sepals 3-5 mm. long, yellowish; petals spatulate or oblanceolate, clawed; *Ranunculus Nuttallii* A. Gray. Foot-hills and draws: Colo.—Wyo. *Submont.* Ap—Jl.

2. *C. rupestris* Greene. Stem about 3 dm. high; leaves long-petioled; blades biternate, thin, with broad divisions; flowers few, 5 or 6, on slender pedicels, petals variable, some obovate, some spatulate and long-clawed. Moist cliffs. Black Cañon, Colo. *Submont.* Je.

3. *C. neglecta* Greene. Stem 3 dm. or more; leaves like those of *C. ranunculina*, divisions less dissected and with broader lobes; sepals 3 mm. long; petals usually none, or few and narrowly spatulate; stamens few, usually about 10. Dry ravines: Colo. *Submont.* My.

15. CÁLTHA (Rupp.) L. MARSH-MARIGOLD, MEADOW-GOWAN.

Perennial herbs, somewhat fleshy. Leaves few, mostly basal, petioled; blades elliptic, oval, cordate or reniform, entire or crenate. Sepals 5-15, large, more or less petal-like, deciduous, yellow, white, or pink. Petals wanting. Stamens numerous; filaments short. Carpels numerous or several, sessile; ovules numerous, in 2 rows on the ventral suture. Fruit follicles, dehiscent on the ventral suture.

Stem scapiform or rarely with a small leaf, erect; sepals white or greenish white.

Plant 1-3 dm. high, often 2-flowered, leaf-blades orbicular or oval, 3-10 cm. long.

Filaments narrower than and twice as long as the anthers, follicles erect

Filaments broader than the anthers and only slightly longer; follicles ascending or more or less spreading above.

Plant 5-8 cm. high, one-flowered, leaf-blades 1-2 cm. long; filaments broader than the anthers and 2-3 times as long.

Stem leafy, creeping or floating.

1. *C. leptosepala*.

2. *C. rotundifolia*.

3. *C. cheidoni*.

4. *C. natans*.

1. *C. leptosepala* DC. Glabrous perennial, with a short erect rootstock; leaf-blades oval in outline, with a shallow sinus, sinuately toothed or crenate; petals oblong, 10-18 mm. long; follicles about 15 mm. long; beak somewhat curved, nearly 1 mm. long. *C. Macounii* Greene. Swamps and marshy meadows: Wash.—B.C.—Mont.—Alta. *Mont.*—*Alp.* Jl—Au.

2. *C. rotundifolia* (Huth) Greene. Glabrous perennial, with a short usually erect rootstock; leaves mostly basal, long-petioled, 2-3 dm. long; blades of the earliest sometimes orbicular, with a deep closed sinus, the rest or all more elongate, with an open sinus, dentate, crenate, or subentire; peduncles 2-3 dm. high; sepals 6-10, oblong or rarely oval, 12-20 mm. long; follicles 15-20 mm. long, straight; beak about 1 mm., straight. *C. leptophylla rotundifolia* Huth. *C. chionophila* Greene. Swamps and under the snow: Wyo.—N.M.—Utah. *Mont.*—*Subalp.* Je—Au.

3. *C. chelidoni* Greene. Dwarf perennial; leaves mostly basal, 3-4 cm long, short-petioled; blades broadly cordate to oval or ovate in outline, with a short open sinus, mostly entire; petals 5-8, 10-12 mm. long, oblong. *C. uniflora* Rydb., a dwarf form with a large flower. Along alpine streams and below the snow: B.C.—Mont. Alp. Jl-Au.

4. *C. natans* Pallas. Stem slender, floating or creeping, rooting at the nodes, 1.5-5 dm. long; lower leaves long-petioled; blades cordate-reniform, 3-5 cm. wide, entire or crenate, with a narrow sinus; upper leaves short-petioled and smaller; sepals white or pinkish, 6-8 mm. long, oval, obtuse; follicles about 4 mm. long; beak minute. In water: Minn.—Alta.—Alaska; Siberia. *Mont* — *Boreal*. Jl-Au.

16. *TROLLIUS* L. GLOBE-FLOWER.

Glabrous perennials, with rootstocks. Leaves alternate, palmately lobed or divided. Flowers solitary, or few, terminal, regular, perfect. Sepals 5-15, yellow, lilac, or in ours white, petaloid, deciduous. Petals 5-8, small, tubular at the base. Stamens numerous, hypogynous. Pistils numerous, forming a subglobose head. Fruit of numerous subcylindric, many-seeded follicles, opening along the ventral suture. Seeds numerous in two rows.

1. *T. albiflorus* (A. Gray) Rydb. Stem erect, 2-6 dm. high, 2-4-leaved; lower leaves long-petioled, the uppermost subsessile; blades palmately divided, 5-10 cm. wide, nearly orbicular in outline; divisions rhombic or obovate, cleft and incised; sepals 5-7, ovate or broadly oval, white; petals clawed, 3-5 mm long, linear; follicles 10-20, about 1 cm. long. *T. laxus albiflorus* A. Gray. Wet meadows and along streams: Alta.—B.C.—Wash.—Colo. *Mont*.—*Subalp*. Je-Au.

17. *COPTIS* Salisb. GOLD-THREAD.

Low scapose perennial herbs, with slender rootstocks. Leaves basal, petioled, ternately compound. Scape slender, 1-flowered. Sepals 5-7, oval, petal-like, deciduous, white, with yellowish bases. Petals shorter than the stamens, club-shaped, hollowed and nectariferous at the thickened summit. Stamens numerous. Pistils 3-7. Fruit of as many stipitate follicles, forming an umbel-like cluster. Seeds smooth and shining.

1. *C. trifoliata* (L.) Salisb. Leaves 5-10 cm. long, ternate; leaflets evergreen, broadly obovate, slightly 3-5-lobed and crenate, shining; scape 5-12 cm. long; sepals white, with yellow base; petals 2-3 mm. long; stipe of the follicles 7-8 mm long; body about 6 mm. Woods and bogs: Greenl.—Md.—Minn.—B.C.—Alaska; n Eurasia. *Mont*.—*Boreal*. My-Au.

18. *CHRYSOCOPTIS* Nutt.

Low scapose perennials, with rootstocks. Leaves basal, petioled, pinnately 3-5-foliate, with lobed or dissected leaflets. Scapes 2-4-flowered. Flowers perfect, regular. Sepals 5 or 6, linear or ligulate, attenuate, greenish or yellowish white, deciduous. Petals filiform or ligulate beyond the nectariferous portion. Pistils several. Fruit of stipitate follicles. Seeds several, smooth and shining.

1. *C. occidentalis* Nutt. Leaves 1-1.5 dm. long, long-petioled, pinnately ternate; divisions broadly ovate, pinnately 3-5-lobed and serrate, shining, 3-6 cm. long; main peduncle about 1 dm. long; petals and sepals subulate; stipe of the follicles about 6 mm.; body about 12 mm. long. Woods: Mont.—Ore.—Wash *Submont*.—*Mont*. My-Je.

19. *ACTAEA* L. BANEERRY.

Perennial herbs, with thick rootstocks and erect stems. Leaves basal and cauline, ternately decompound. Flowers small, in terminal racemes. Sepals 3-5, petal-like, usually white. Petals 4-10, small, narrow, clawed. Stamens numerous; filaments flattened, white. Pistil solitary, sessile; style none; stigma 2-lobed, depressed. Fruit berry-like, with depressed, horizontal seeds.

Filaments whitish; raceme short, pedicels in fruit 1-3 cm. long.

Fruit white, ellipsoid, 9-12 mm. long

1. *A. eburnea*.

Fruit red

Fruit ellipsoid, 10-12 mm long

2. *A. rubra*.

Fruit spherical or nearly so, 5-7 mm long.

3. *A. arguta*.

Filaments greenish, raceme elongate, pedicels very short, even in fruit less than 1 cm long, fruit red

4. *A. viridiflora*.

1. *A. eburnea* Rydb. Stem 6-10 dm. high, glabrate or villous-puberulent above, leaves ternate or twice ternate, the divisions pinnate; leaflets ovate, usually 3-5-lobed, and sharply serrate; pedicels slender; sepals orbicular, early deciduous; petals narrowly rhombic-spatulate, acute; fruit about 12-seeded; seeds obliquely pear-shaped, about 4 mm. long. In rich woods: B.C.—Ore.—Utah—Colo.—S.D., n N.Y.—Newf. *Submont.—Mont. My-Je.*

2. *A. rubra* (Ait.) Willd. Like the preceding, but lower, 3-6 dm. high; leaflets shorter and broader, firmer, darker, acute or short-acuminate; teeth coarser, less sharp; pedicels more divaricate; petals spatulate, acute; seeds about 3 mm. long. Rich woods: N.S.—N.J.—Ia.—Mont.—Alta. *Boreal—Mont. My-Je.*

3. *A. arguta* Nutt. Very similar to *A. eburnea* in habit, fully as tall; leaflets very thin and light green, long-acuminate and very sharply toothed; sepals with long claws and rhombic acute blades; seeds about 10, about 3 mm. long. Woods: Alaska—Calif.—N.M.—S.D.—Alta. *Submont.—Mont. My-Je.*

4. *A. viridiflora* Greene. Stems usually several from the rootstock, fully as tall as in the preceding, leaflets darker green, ovate-lanceolate, more regularly toothed, more pubescent when young; petals clawed; blades ovate, obovate or lanceolate, usually greenish; fruit red, 10-12-seeded. *A. multicaulis* Greene. Rocky woods: Ariz.—Colo.—N.M. *Submont.—Mont. Je-Jl.*

20. AQUILEGIA (Tourn.) L. COLUMBINE.

Perennial herbs, with rootstocks and branching stems. Leaves basal and cauline, ternately decompound. Flowers perfect, usually large and showy, regular. Sepals 5, petal-like, deciduous. Petals concave, produced below into a hollow spur, or at least saccate. Stamens numerous, the inner reduced to stamunodia; filaments more or less flattened. Pistils 5, sessile, many-ovuled. Fruit follicles, many-seeded, with slender styles. Seeds numerous, smooth and shining, with a hard coat.

Plant very low; stem scapiform and 1-flowered; spur curved; flower blue or purple.

1. *A. Jonesii*.

Stem more or less leafy.

Petals merely saccate, not spurred at the base, terminal leaflet rhombic, acute

2. *A. Eastwoodiae*.

Petals spurred, all leaflets obtuse

Lamina of the petals longer than the strongly curved spurs, truncate.

Stems many times exceeding the basal leaves, styles in fruit about one-fourth as long as the follicles

3. *A. brevistylis*.

Stem only slightly exceeding the basal leaves, styles in fruit about half as long as the follicles

Plant perfectly glabrous; flowers blue.

4. *A. saximontana*.

Peduncles and follicles sparingly hairy; flowers sulphur-yellow or greenish

5. *A. latimontensis*.

Lamina of the petals shorter than the slightly curved or straight spurs.

Spur not over 2 cm long; flowers nodding.

Sepals and spurs red, spur usually straight (except in No 9)

Lamina of the petals small, less than 4 mm. long or none, sepals spreading or reflexed.

Sepals 10-15 mm. long, shorter than or rarely equalling the spurs.

6. *A. truncata*.

Sepals 15-25 mm long, exceeding the spurs.

7. *A. columbiana*.

Lamina of the petals 6-12 mm long

Sepals spreading or reflexed, longer than the spurs

8. *A. formosa*.

Sepals ascending, usually shorter than the spurs

Sepals much longer than the lamina of the petals, spur incurved.

9. *A. latiuscula*.

Sepals equalling or little exceeding the lamina of the petals, spur straight

Spur gradually tapering to the apex, follicles glabrous.

10. *A. rubicunda*.

- Spur cylindric-filiform for some distance near the apex, fol-
licles pubescent. 11 *A. elegantula*
Sepals and spurs wholly yellow; spur usually slightly curved
Leaves thick, densely pubescent beneath; spur slender, abruptly nar-
rowed near the base 12. *A. micrantha*
Leaves thin, glabrous or glabrate, spur gradually tapering to near the
apex. 13. *A. flavescens*
Spur 2.5-6 cm. long, flowers in anthesis usually erect.
Basal leaves usually twice ternate, spur 3-4 cm. long.
Sepals blue or white, ovate-lanceolate, acute or obtuse; spur 3-5 cm
long.
Stem (except the upper part) and petioles glabrous.
Plant 3-5 dm. high, leaflets thin, rather large, not conspicuously
glaucous 14. *A. coerulea*
Plant 1-2 dm. high, leaflets thick, small and conspicuously
glaucous. 15. *A. scopulorum*
Stem and petioles glandular and villous throughout.
16. *A. pallens*
Sepals yellow, lanceolate, somewhat acuminate, spur 2.5-3 cm long
17. *A. oreophila*
Basal leaves usually thrice ternate; spur 4-7 cm. long, sepals yellow
Spur 4-5 cm long, sepals less than 2 cm. long, ovate-lanceolate, acute.
Follicles strongly curved outward. 18. *A. thalictrifolia*
Spur 5-7 cm. long, sepals 2-4 cm. long, lanceolate to ovate-lanceolate,
acuminate, follicles almost straight. 19. *A. chrysantha*

1. *A. Jonesii* Parry. Acaulescent plant, with a densely cespitose short caudex; basal leaves 2-10 cm. long, pubescent, biternate; blades 1-2 cm in diameter, glaucous; divisions broadly cuneate, deeply 3-5-cleft; scape 2-5 cm, rarely 10 cm. long; flower erect; sepals about 1.5 cm. long; lamina of the petals broad, rounded at the apex, about 8 mm long; spur 8-10 mm. long, somewhat incurved; follicles 1.5-2 cm. long. Exposed rocky summits: Wyo.—Alta Subalp.—Alp. Je-Jl.

2. *A. Eastwoodiae* Rydb. Stem 4-6 dm. high, glandular-puberulent above; leaves biternate; leaflets 1-2 cm. long, with oblong obtuse lobes; flowers white or roseate; sepals lanceolate, acute, spreading; petals nearly like the sepals; follicles about 12 mm. long; styles 6-7 mm. *A. ecalcarata* Eastw. *A. mancosana* (Eastw.) Cockerell. Cañons: Colo. Son. Je-Jl.

3. *A. brevistyla* Hook. Stem 4-10 dm. high, pubescent or glandular above; basal leaves biternate; stem-leaves ternate or the upper simple and 3-lobed; leaflets 3-lobed and coarsely crenate; sepals blue, lanceolate, acute, about 15 mm. long; lamina of the petals yellowish white; spur 6-8 mm. long; follicles 2-2.5 cm. long. Meadows and open woods: Yukon—Alta.—S.D.—Minn. Plain—Submont. Je-Jl.

4. *A. saximontana* Rydb. Stem 1-2 dm. high; leaves all biternate; leaflets obovate, 2-3-cleft; sepals greenish or blue, obtuse or acutish; lamina of the petals yellowish; spur 5 mm. long or less; follicles 1-1.5 cm. long. *A. vulgaris brevistyla* A. Gray. *A. brevistyla* Coulter, not Hook. Among rocks: Colo.—e Utah. Mont.—Subalp. Jl—Au.

5. *A. larimiensis* A. Nels. Stem 2-3 dm. high, branched; leaves, except the uppermost biternate; leaflets obovate or cuneate, 1.5-2.5 cm. long, 2-3-cleft and again round-lobed; sepals ovate, acute; lamina of the petals cream-colored, spur 7-8 mm. long; follicles about 1.5 cm. long. Crevices in rocks: Wyo. Mont. Jl—Au.

6. *A. truncata* Fisch & Mey. Stem 3-7 dm. high, sparingly pubescent or glabrate; lower leaves biternate, the upper ternate; leaflets obovate, 2-6 cm. long, usually pale and pubescent beneath, 3-cleft and round-lobed; sepals scarlet, lanceolate, acute or acuminate; lamina very short, rounded or obsolete, yellowish; spur scarlet, narrow, elongate-conic, 1.5-2 cm. long, merely with a knob at the end; follicles pubescent, about 2 cm. long. Shady places along streams B.C.—Calif.—s Utah. Submont.—Mont. My-Jl.

7. *A. columbiana* Rydb. Stem 6-10 dm. high, glabrous or sparingly pubescent above; leaves twice ternate; leaflets obovate, 2-3 cm. long, more or less glaucous beneath, 2-3-cleft and deeply crenate at the apex; sepals and spurs very bright red; sepals ovate-lanceolate, acute; lamina yellowish, scarcely 3 mm.

long, truncate; spur 12–18 mm. long; follicles erect, densely pubescent. Meadows and open woods: Alaska—Ore.—Ida.—Alta. *Submont.*—*Mont.* My—Au.

8. *A. formosa* Fisch. Very similar to the last; leaflets often 4 mm. long; sepals about 2 cm. long, ovate-lanceolate, acuminate; lamina yellow, 6–10 mm. long, truncate; spur 12–18 mm. long, more gradually tapering; fruit as in the preceding. Wooded hillsides and banks of streams: Alaska—n Calif.—*Mont.* *Submont.*—*Mont.* Je—Au.

Aquilegia flavescens × *formosa*. This resembles *A. flavescens* most in habit and the shape of the flowers, but the sepals and spurs are more or less tinged with red. *Mont.*

9. *A. latiuscula* Greene. Stem 2–6 dm. high, glabrous or sparingly glandular-pubescent above; leaves biternate; leaflets obovate or cuneate, 2–4 cm. long, deeply 3-cleft and round-lobed or crenate, glaucous beneath; sepals ovate-lanceolate, acute, 10–12 mm. long, purplish red; lamina 8–10 mm. long, yellow, rounded at the apex, spur 12–15 mm. long, abruptly narrowed at the middle, more or less incurved; follicles pubescent, about 2 cm. long. *A. vulgaris hybrida* Hook. *A. vulgaris violacea* Nutt. Closely related to *A. coccinea* Small. Open woods: Iowa—Kans.—S.D. *Plain*—*Submont.*

10. *A. rubicunda* Tidest. Stem 1–3 dm. high, pubescent; basal leaves long-petioled, triternate; leaflets 1 cm. long or less, truncate or cuneate at the base, with rounded lobes; sepals ovate, acute, reddish, 1 cm. long or less; lamina of the petals pale yellow, 5–7 cm. long, rounded; spur 2 cm. long. Among rocks: Utah *Mont.*

11. *A. elongatula* Greene. Stem 2–4 dm. high, usually with but a single leaf, leaves biternate; leaflets 1.5–2.5 cm. long, deeply 3-cleft and again round-lobed, sepals erect, ovate-lanceolate, acute, greenish or scarlet, about equalling the lamina; this rounded or truncate at the apex, yellow, 8–10 mm. long; spur scarlet, straight, 1.5–2 cm. long. Closely related to *A. canadensis* L. Wooded hillsides, especially in rocky places: Colo.—N.M.—Utah. *Submont.*—*Subalp.*

12. *A. micrantha* Eastw. Stem 4–5 dm. high, densely glandular-pubescent above; leaves biternate, the upper reduced and more simple; leaflets broadly cuneate, 1–2 cm. long; sepals oval, about 1 cm. long, yellowish or tinged with red, lamina truncate, 7–8 mm. long; spur straight or slightly recurved, 12–15 mm. long, follicles glandular, about 1.5 cm. long, arcuate-spreading above. Canyons: s Utah. *Son.* JI

Aquilegia elegantula × *micrantha*. This resembles *A. micrantha* most, but the spurs are less slender and as well as the sepals tinged with red. se Utah.

13. *A. flavescens* S. Wats. Stem 2–7 dm. high; leaves biternate, or the upper only ternate or simple; leaflets 2–4 cm. long, 3-cleft and round-lobed; sepals light yellow or ochroleucous, or tinged with scarlet, lanceolate, 10–18 mm. long; lamina cream-colored, 5–8 mm. long; spur 10–15 mm. long, usually slightly incurved-hooked; follicles about 2 cm. long, pubescent. *A. canadensis aurea* Regel. *A. aurea* Junka. *A. depauperata* M. E. Jones. Open woods: B C—Ore.—Utah—Wyo.—Alta. *Submont.*—*Mont.* Je—Au.

14. *A. coerules* James. Stem 2–6 dm. high, from glabrous or nearly so to glandular-pubescent above; leaves except the uppermost biternate; leaflets deeply 2–3-cleft and round-lobed, 1–3 cm. long, glabrous; sepals 2–4 cm. long, blue, rose, or white, ovate-lanceolate; lamina 1.5–2.5 cm. long, rounded at the summit, white or cream-colored; spur straight, 3–5 cm. long; follicles about 3 cm. long, pubescent. *A. leptocera* Nutt., white-flowered form. COLORADO STATE FLOWER. Woods and hillsides: N.M.—*Mont.*—Ida.—Calif. (in *Mont.* and Ida., mostly represented by the white form). *Submont.*—*Subalp.* Je—Au

A. coerules × *elegantula*. This resembles *A. coerules*, but the flowers are smaller, the spurs and sepals shorter and tinged with red. se Utah.

A. coerules × *flavescens*. Like *A. flavescens*, but usually lower, with large pale yellow flowers, longer spur and sometimes slightly tinged with blue. Utah.

15. *A. scopulorum* Tidest. Stem 1–2 dm. high, glabrous or somewhat pubescent above; basal leaves biternate; leaflets crowded, sessile, 1 cm. long or

less, 3-lobed; stem-leaves few, small, ternate; sepals ovate-oblong, pale blue or pale purple; lamina of the petals white, oblong, rounded; spurs slender, 3-5 cm. long; follicles pubescent. Mountains: Utah. *Mont.—Subalp.* My-Jl.

16. *A. pallens* Payson. Stem slender, erect; lower leaves biternate; leaflets cuneate to suborbicular, inclined to be revolute-margined, glaucous, viscid and pubescent beneath; sepals 1.5 cm. long, white or pale blue, lanceolate; petals white; lamina truncate, 8 mm. long, 6 mm. broad; spur slender, straight, 3 cm. long; follicles pubescent. *A. coerulea calcarea* M. E. Jones. Moist sandstone cliffs: s Utah—w Colo. *Son.* Je.

17. *A. oreophila* Rydb. Very similar to *A. coerulea*, but with usually smaller yellow flowers; leaves usually coarser; leaflets 2.5-3 cm. long; lamina about 1.5 cm. long; spur 2.5-3 cm.; follicles 2.5 cm. *A. coerulea alpina* A. Nels. *A. coerulea flavescens* Jones. On naked summits: Wyo.—Utah *Subalp.—Alp.* Jl—Au.

18. *A. thalictrifolia* Rydb. Stem 2-5 dm. high, glabrous below, finely viscid-puberulent above; leaves twice ternate; leaflets broadly obovate-cuneate, 2-3-cleft and crenate at the apex, 1-1.5 cm. long, bluish green; flowers yellow; laminae of the petals 7-12 mm long, truncate or rarely rounded at the apex, spur very slender from the base; follicles about 3 cm. long, strongly reticulate and pubescent. Rocky ravines: Tex.—Colo.—Utah—Ariz. *Submont.—Subalp.* Je—Au.

19. *A. chrysantha* A. Gray. Stem 3-10 dm high, glabrous, or viscid-puberulent above; leaves triternate or the upper ternate; leaflets broadly cuneate, 3-cleft and round-crenate at the apex, 1.5-4 cm. long; flowers yellow; lamina about 2 cm. long, rounded at the apex; follicles about 3 cm. long, narrower and straighter than in the preceding. Along streams and in ravines: N.M.—(? Colo.) —Ariz. *Submont.* My—S.

21. DELPHINIUM (Tourn.) L. LARKSPUR.

Annual or perennial herbs, usually with erect branching stems. Leaves alternate, mostly cauline, palmately lobed or divided. Flowers in racemes or panicles, perfect, irregular, zygomorphic. Sepals 5, the posterior produced below into a spur. Petals 2 or 4, the two posterior spurred, the lateral ones, if present, small, all in most species 2-cleft at the apex. Stamens numerous. Pistils 1-5, in ours mostly 3, many-ovuled; stigmas introrse. Fruit many-seeded follicles.

A. Carpels and follicles 3, rarely 4 or 5.

I. Pedicels erect or nearly so

a. Sepals white or merely tinged with blue or with a blue spot; follicles more than 1 cm. long, about four times as long as broad, seeds squamellate (I CAROLINIANA)

Lobes of the lateral petals divergent; lower pedicels elongate, spur mostly erect; stem strigose-canescens throughout 1. *D. Penardii*

Lobes of the lateral petals not divergent, lower pedicels not elongate, spur mostly horizontal, stem usually glabrous below, viscid above 2. *D. virescens*

b. Sepals dark blue; follicles less than 1 cm. long, only 2-3 times as long as broad, seeds not squamellate, but wing-margined (II STRICTA)

Lower petals blue and bearded, perennials with fasciculate tuberous roots—Stem glabrous below.

Stem glabrous throughout; pedicels equalling or exceeding the spur

Leaves pubescent, follicles glabrous 27. *D. Brownii*

Leaves glabrous and glaucous; follicles strigose

Stem puberulent above; follicles viscid-villous, 25. *D. elongatum*

Pedicels shorter than the spurs. 3. *D. distichum*

Pedicels longer than the spurs 4. *D. megacarpum*

Stem more or less pubescent throughout, finely so below, viscid above

Spur with reflexed tip, upper petals with a lanceolate, 2-cleft apex;

inflorescence appressed-pubescent. 5. *D. simplex*

Spur straight, upper petals with an obliquely ovate-triangular apex,

slightly 2-toothed; inflorescence villous. 6. *D. cyanoretos*

Lower petals white; roots fleshy, fusiform.

Stem leafy throughout, viscid

7. *D. diversicolor*.

Stem leafy only at the base, glabrous below.

8. *D. Burketi*.

- 11 Pedicels ascending or spreading.
- a. Inflorescence few-flowered; the lower pedicels elongate; sepals broad, spreading, dark blue; leaf-segments narrow; root short and thickened, often tuber-like. (III. BICOLORIA.)
- Upper petals as well as the lower blue; pod straight. 9. *D. Helleri*.
- Upper petals white or yellowish, only veined with blue, the lower mostly blue.
- Follicles 1.5–2 cm. long, more or less arcuate, the upper portion divergent.
- Roots fascicled, thick, but not tuber-like, stem usually viscid, at least above; blades of the lateral petals about 10 mm. long.
- Spur fully half longer than the obtuse lateral sepals.
10. *D. Leonardi*.
- Spur only slightly longer than the acute lateral sepals.
11. *D. bicolor*.
- Roots tuber-like, stem not viscid; blades of the lateral petals about 5 mm. long.
- Stem with long, soft reflexed hairs. 12. *D. Menziesii*.
- Stem appressed-strigose or glabrous.
- Flowers dark blue. 13. *D. Nelsonii*.
- Flowers light blue. 14. *D. dumetorum*.
- Follicles less than 1 cm. long, only the tips divergent; stem strigose; root tuber-like.
- Segments of the leaves all narrow. 15. *D. Nuttallianum*.
- Segments of the basal leaves oblong to cuneate. 16. *D. depauperatum*.
- b Lower pedicels not elongate, plant with a long woody taproot or a rootstock.
- 1 Segments of the basal leaves obtuse, mucronate. (IV. SCAPOSA.)
- Sepals light blue, lobes of the first basal leaves linear-oblong, spur a little longer than the upper petals. 17. *D. coelestinum*.
- Sepals dark blue, lobes of the first basal leaves rounded to oblong; spur nearly twice as long as the upper petals.
- Follicles glabrous or sparingly viscid, stem usually scapiform.
18. *D. scaposum*.
19. *D. xylorrhizum*.
2. Segments of all the leaves acute or acuminate.
- a Plant not all viscid.
- * Follicles pubescent. (V. ROBUSTA.)
- Stem grayish strigose throughout.
- Leaves divided into cuneate, merely cleft, segments
20. *D. geraniifolium*.
- Leaves repeatedly divided into linear lobes
- Stem 3–5 dm. high, bractlets oblong, close under the calyx.
21. *D. Geyeri*.
- Stem 5–20 dm. high; bractlets subulate, 2–3 mm. below the calyx.
24. *D. robustum*.
- Stem glabrous and glaucous, at least below.
34. *D. glaucescens*.
- Plant caespitose, 2–4 dm. high.
- Plant not caespitose, 5–20 dm. high.
- Inflorescence dense, follicles scarcely at all arcuate.
- Leaf-segments 3–7, broad, cuneate, merely cleft into broadly lanceolate lobes.
- Sepals yellowish white or light blue.
22. *D. cucullatum*.
- Sepals dark blue. 23. *D. canmorensis*.
- Leaf-segments narrow, repeatedly dissected into linear or linear-lanceolate divisions.
- Inflorescence paniculate, strigose-puberulent; leaf-segments linear. 24. *D. robustum*.
- Inflorescence racemose, simple, glabrous or nearly so; leaf-segments narrowly lanceolate.
25. *D. elongatum*.
- Inflorescence lax, follicles strongly arcuate.
26. *D. ramosum*.
27. *D. Brownii*.
- ** Follicles glabrous. (VI. GLAUCA.)
- b. Plant more or less viscid, especially the pedicels
- * Plant tall, 4–20 dm. high, not caespitose
- Leaves dissected into linear lobes, follicles densely strigose. (VII. VISCIDA.)
28. *D. viscidum*.
- Leaves divided into cuneate or rhomboid, merely cleft, divisions.
- Follicles viscid-pubescent. (VIII. OCCIDENTALIA.)
- Flowers light blue, or yellowish, tinged with blue or purple.
29. *D. multiflorum*.
30. *D. occidentale*.
- Flowers dark blue.
- Follicles glabrous. (IX. SUBALPINA.)
- Sepals obtuse.
- Sepals acute or acuminate.
- Sepals at most equalling the spur. 32. *D. Barbeyi*.
- Sepals much longer than the spur. 33. *D. attenuatum*.
- ** Plant less than 4 dm. high, caespitose. (X. ALPESTRIA.)
- Stem 2–4 dm. high, puberulent or glabrous. 34. *D. glaucescens*.
- Stem about 1 dm. high, viscid-pubescent. 35. *D. alpestre*.
- B Carpels and follicles solitary, petals 2, united. (XI. CONSOLIDAE.)
36. *D. Ajaensis*.

1. *D. Penardii* Huth. Stem 2-4 dm. high; lower leaves numerous, with broad, often oblong or lanceolate divisions; upper stem-leaves few and with narrow lobes; inflorescence short; pedicels strongly curved above, bringing the spur in a nearly erect position; follicles pubescent, fully 2 cm. long, erect, and nearly straight. *D. camporum* Greene. Dry plains: Tex.—Colo.—Ariz. *Plain*—*Submont.* Ap-Jl.

2. *D. virescens* Nutt. Stem 3-15 dm. high; leaves finely dissected, with linear or linear-oblong divisions; racemes long, sometimes 5-6 dm.; spur stout, tinged with blue, usually horizontal; follicles pubescent, cylindric, about 2 cm. long, nearly straight and ascending. *D. albescens* Rydb. Prairies and river valleys: Ill.—Man.—S.D.—Colo.—Tex.—Mo. *Plain.* My-Jl.

3. *D. distichum* Geyer. Stem 3-6 dm. high (rarely higher), strict; blades of the lower leaves rather thick and veiny, divided into cuneate divisions and these again cleft into oblong or lanceolate acute lobes; upper leaves with linear divisions; inflorescence very narrow and spike-like, viscid; sepals oval, obtuse, slightly villous; upper petals white, tinged with blue, obtuse; spur straight, about 15 mm long; follicles erect, viscid-pubescent. Meadows: Wash.—Mont.—Ore. *Submont.* Jl—Au.

4. *D. megacarpum* Nels. & Macbr. Stem 2-5 dm. high, at first cinereous-puberulent, becoming glabrate below; lower leaves long-petioled; blades suborbicular in outline, divided into cuneate divisions cleft into linear lobes, puberulent, slightly ciliate; stem-leaves few and reduced; inflorescence in simple or few-branched racemes; sepals dark blue, softly hirsute; upper sepals brownish white, follicles 2-2.5 cm. long, erect. Among sage-brush: Ore.—Ida.—Wash. *Submont.* Je.

5. *D. simplex* Dougl. Stem about 3 dm. high; blades of the lower leaves rather thick and finely pubescent, divided into three cuneate divisions; these with oblong, obtuse lobes; lobes of the upper leaves linear; inflorescence strict, narrow, and spike-like; sepals pubescent, oblong, obtuse; upper petals with bluish base and brownish white apex; follicles pubescent, when mature 6-8 mm. long. *D. strictum* A. Nels. Meadows: Ore.—Wash.—Wyo. *Submont.* Au.

6. *D. cyanorelos* Piper. Stem 3-6 dm. high; leaves usually with much narrower divisions than in the preceding, those of the stem-leaves narrowly linear; sepals brighter blue and the straight spur lighter in color; upper petals yellowish white, only tinged with blue; otherwise as the preceding. *D. simplex* A. Gray, not Dougl. Damp prairies and wet rocky places: B.C.—Ida.—Ore. *Submont.* Je—Au.

7. *D. diversicolor* Rydb. Stem about 4 dm. high, simple, strict; leaf-blades finely pubescent, palmately dissected into linear lobes; inflorescence a narrow raceme; sepals oblong-oval, obtuse, 10-13 mm long, slightly pubescent; petals all white, with blue veins and yellowish below; follicles densely hairy. Bogs: Mont. *Mont.* Je.

8. *D. Burkei* Greene. Stem leafy only near the base, villous-hirsute above; leaf-blades rather fleshy, divided into linear or oblong-linear, obtusish divisions, racemes long and narrow; sepals pubescent exteriorly; follicles appressed-villous. Arid hills: Ida. *Submont.*

9. *D. Helleri* Rydb. Stem about 3 dm. high, viscid-pubescent throughout, few-leaved; leaf-blades more or less viscid-pubescent, 3-5 cm. broad, the lower dissected into linear obtuse, the upper into narrowly linear acute divisions; sepals more or less pubescent, oval; lower petals with acute crenate lobes; follicles viscid-pubescent, nearly straight, about 2 cm. long. Plains: Ida. *Plain.*

10. *D. Leonardi* Rydb. Stem 2-5 dm. high; leaf-blades 4-5 cm. wide, dissected into oblong, obtuse divisions, more or less viscid-pubescent; upper leaves with narrowly linear, acute divisions; sepals oblong, obtuse, or the upper acute; lower petals with short lobes; follicles over 2 cm. long, curved, viscid-pubescent, or in age glabrate. River banks and beaches: Utah. *Submont.* Ap—My.

11. *D. bicolor* Nutt. Stem 2-5 dm. high, few-leaved; leaf-blades 2-4 cm. broad, puberulent or glabrate, thick, dissected into linear or linear-oblong obtuse

divisions; sepals ovate-lanceolate, acute or acuminate, about 15 mm. long; upper petals pale brownish yellow, with blue veins, usually uncleft; lower petals with obtuse wavy lobes; foliicles from densely viscid-pubescent to glabrous, 1.5-2 cm. long. Dry ground in the mountains: Wash.—Sask.—Wyo.—Utah—Ore. *Plain*—*Mont.* Ap—Jl.

12. *D. Menziesii* DC. Closely resembling the preceding, but more or less long-hairy throughout; stem 2-5 dm. high; divisions of the basal leaves shorter and broader and often acutish; lower petals scarcely longer than the upper; blades rounded and only slightly cleft; foliicles glabrous or pubescent, arcuate. On hills: B.C.—Ida.—Calif. *Son.*—*Submont.* Ap—Je.

13. *D. Nelsonii* Greene. Closely resembling *D. bicolor* in habit, but usually more slender; stem 2-5 dm. high, finely strigose-puberulent; leaf-blades dissected into linear obtuse divisions; sepals oblong or oval, usually obtuse; petals as those of *D. bicolor* but shorter; foliicles about 15 mm long, strigose or glabrous. *D. pinetorum* Tidest. Hills and grassy slopes: N.M.—Neb.—Alta.—Wash—Mont.—Utah. *Submont.*—*Mont.*

14. *D. dumetorum* Greene. Stem 4-6 dm. high, glabrous or slightly pubescent above, few-leaved; leaf-blades glabrous, 5 cm. broad, 5-divided to the base, the divisions again cleft into broadly linear lobes; sepals pale lavender, blue, or white tinged with blue, oblong or oval, obtuse, about 12 mm. long; petals white tinged with yellow; foliicles puberulent, more or less spreading. Dry hills: Colo. *Submont.* Je.

15. *D. Nuttallianum* Pritzel. Resembling *D. Nelsonii*, but more slender; stem strigose-puberulent or glabrous, 2-4 dm. high; leaf-blades about 3 cm. wide, strigose or glabrate, dissected into narrowly linear lobes; sepals oblong, 8-10 mm. long, obtuse; upper petals whitish, obtuse and merely notched; lower petals with obtuse lobes; foliicles 7-8 mm. long, glabrous. *D. pauciflorum* Nutt. Dry places in the mountains: Wash—Mont.—Wyo.—Utah—Ore. *Submont.*—*Subalp.* My—Au.

16. *D. depauperatum* Nutt. Stem about 3 dm. high, viscid-puberulent, rather simple; basal leaf-blades orbicular in outline, 1-4 cm. broad, 5-cleft; divisions usually cuneate, with 2 or 3 oblong lobes; stem-leaves reduced and with narrower divisions, oblong, obtuse; upper petals notched; foliicles nearly straight, 6-7 mm. long, viscid. Poor soil: Ore.—Ida.—Calif. *Son.* Je—Jl.

17. *D. coelestinum* Rydb. Stem 4-5 dm. high, glabrous or slightly pubescent above, leafy; leaves long-petioled; blades about 3 cm. broad, sparingly pubescent, divided to the base into 3-5 narrowly cuneate divisions, these again cleft into linear-oblong lobes; sepals oblong, obtusish, about 1 cm. long; upper petals yellowish white; lower petals light blue, with obtusish wavy lobes; foliicles 8-10 mm long, slightly puberulent, nearly straight. Arid regions: s Utah—Ariz. *L. Son.* My.

18. *D. scaposum* Greene. Stem 2-5 dm high; leaves basal, fleshy, petioled; blades of the earliest reniform in outline, about 3 cm. broad, 3-cleft and the divisions round-lobed, those of the later leaves more deeply cleft; sepals dark blue, ovate, acutish, 10-12 mm. long; upper petals yellowish, tinged with blue; lower petals dark blue, with sinuate obtuse lobes; foliicles glabrous or sparingly viscid. Dry ground: N.M.—s Colo.—s Utah—Ariz. *Son.* Ap—Je.

19. *D. xylorhizum* Rydb. Stem not scapose, 2-3 dm. high, glabrous; leaf-blades of the basal leaves fleshy, divided into 3 broadly cuneate, cleft and lobed divisions; stem-leaves with linear-oblong lobes; sepals dark blue, oval, obtuse, pubescent outside; upper petals yellowish, with very obtuse lobes; lower petals blue, with sinuate, obtuse lobes. Dry clayey hills: Lima, Mont. *Submont.* Je—Jl.

20. *D. geraniifolium* Rydb. Stem stout, 3-4 dm. high, leafy; leaves grayish strigose; blades 4-6 cm. broad, mostly 5-divided to the base; ultimate lobes oblong or lanceolate, acute; sepals dark blue, oval, acute; upper petals yellowish, tipped with blue, acute, scarcely cleft; lower petals with acute lobes; foliicles strigose. Dry hills: Ariz.—Colo. *Submont.* Au.

21. *D. Geyeri* Greene. Stem 2-7 dm. high, leafy mostly towards the base; leaves grayish strigose; blades 5-8 cm. broad; sepals deep blue, oblong to oval, 1-1.5 cm. long; upper petals yellow, tinged with blue, obtuse or acutish, entire, the lower deep blue, with sinuate obtuse lobes; follicles about 15 mm. long, nearly straight, canescent. Dry mesas and rocky hills: Colo.—Wyo.—Utah. *Submont.* My-Jl.

22. *D. cucullatum* A. Nels. Stem 6-15 dm. high, finely puberulent above, leaf-blades 1-2 dm. broad, finely puberulent; inflorescence narrow and dense, sepals pubescent, but not glandular; upper petals yellowish, undivided; lower petals blue, with obtuse sinuate lobes; follicles about 15 mm. long, villous, thick, straight. (?) *D. abietinum* Tidest. Wet meadows. Mont.—Ida.—Utah—Colo. *Submont.*—Mont. Jl—Au.

23. *D. canmorense* Rydb. Stem more than 5 dm. high; leaf-blades 8-10 cm., densely puberulent; sepals acute, fully 1 cm. long, strigose outside; upper petals brownish; lower petals dark blue, with lanceolate acute lobes. Rocky mountains: Canmore, Alta. *Mont.* Jl.

24. *D. robustum* Rydb. Stem leafy, often 2 m. high or more, puberulent throughout, often 1 cm. in diameter at the base; leaf-blades puberulent on both sides, divided to the base into 5-7, twice cleft segments; ultimate lobes linear, sepals dark blue, paler at the base, all except the upper one obtuse, 12-15 mm. long; upper petals narrow, light brownish; lower petals with slender claws bent at right angles, bearded only within; follicles densely pubescent. Meadows. Colo.—N.M. *Submont.*—Mont. Jl—Au.

25. *D. elongatum* Rydb. Stem tall, slightly strigose in the inflorescence, leaf-blades digitately divided into about 7 divisions, glabrous and glaucous beneath; ultimate lobes lanceolate, acute; sepals and petals dark blue, the former oval, about 1 cm. long; follicles erect, 12-15 mm. long, strigose-puberulent. Hills and mountains: Colo.—Mont.—Alta. *Submont.*—Mont. Au.

26. *D. ramosum* Rydb. Stem often 2 m. high, often tinged purplish or bluish; leaf-blades glabrous above, finely puberulent beneath, divided to near the base into 5-7 cleft segments; ultimate lobes oblong or lanceolate; inflorescence with slender branches, puberulent; sepals dark blue, slightly brownish at the base, about 1 cm. long, ovate, puberulent; upper petals dirty white, tinged with brown and blue, about 8 mm. long; lower petals dark blue, bearded, only slightly 2-lobed at the apex; follicles 12-15 mm. long, somewhat spreading and with divaricate beaks. Cañons. Colo.—Wyo. *Submont.*—Mont. Jl.

27. *D. Brownii* Rydb. Stem about 1 m. high, glabrous and shining throughout; leaf-blades palmately divided into about 5 divisions, puberulent; divisions 4-6 cm. long, oblanceolate in outline, cleft into lanceolate, acute, somewhat spreading lobes, inflorescence a rather lax raceme; sepals dark blue or purple, oblong-oval, obtuse, 10-12 mm. long; lateral petals also blue or purplish; upper petals of the same color or paler, acute; follicles erect, glabrous. Meadows. Sask.—Mont.—Alaska. *Submont.* Jl—Au.

28. *D. viscidum* Rydb. Stem about 3 dm. high, grayish strigose below, densely glandular-viseid above; leaf-blades 5-7 cm. broad, densely grayish strigose; inflorescence branched; sepals dark blue, 12-15 mm. long, oblong, acute; upper petals yellowish, tinged with blue, obtuse, entire; lower petals dark blue, with obtuse sinuate lobes; spur 10-12 mm. long, somewhat S-curved. Plains. Wyo. *Plain.* Jl—Au.

29. *D. multiflorum* Rydb. Stem about 1 m. high or more, glabrate below; leaf-blades glabrous and glaucous, pubescent only on the margins and veins; segments 5-7 cm. long, cleft into lanceolate, ovate, or oblong acute lobes; inflorescence long and dense, often branched; sepals light blue, with darker median lines or blotches towards the tips, oblong-oval, obtuse, or the upper acutish, finely puberulent; petals of the same color as the sepals; follicles erect. Along streams, damp meadows, etc.: Wash.—Ida.—Colo. *Submont.*—Mont. Jl—Au.

30. *D. occidentale* S. Wats. Stem 1 m. or more high, glabrous below; leaf-blades 1-1.5 dm. wide, pubescent on both sides, divided into 3-7 rhombic, twice

cleft divisions; inflorescence many flowered and usually branched; sepals dark blue, oval, obtuse or the upper acute, viscid outside; upper petals yellowish, tinged with blue, obtuse, entire; lower sepals with broad acute sinuate lobes; foliicles about 15 mm. long, straight. *D. quercolorum* Greene. Higher mountains: Ida.—Utah—Colo.—Wyo. *Mont.—Subalp.* Jl—Au.

31. *D. reticulatum* (A. Nels.) Rydb. Stem 6–12 dm. high, glabrous and glaucous below; leaf-blades 8–10 cm. broad, pubescent, divided into 3–5 broadly cuneate, 3-cleft, toothed divisions; inflorescence mostly simple; sepals usually dark blue, often streaked with yellow, viscid-villous outside; upper petals usually blue, variegated with yellow; lower petals with acutish sinuate lobes; foliicles fully 1 cm. long, straight. Moist glades and open woods: Ida.—Wyo.—Colo. *Submont.—Mont.* Jl—Au.

32. *D. Barbeyi* Huth. Stem 3–10 dm. high, stout, usually pubescent throughout; leaf-blades 7–15 cm. broad, pubescent; divided or cleft into about 5 variously cleft divisions; inflorescence short and dense; sepals dark blue, acuminate, viscid-pubescent with yellowish hairs; upper petals yellow, tinged with blue; lower petals with broad acute sinuate lobes. *D. subalpinum* (A. Gray) A. Nels. Grassy parks and open woods: Wyo.—Colo.—Utah. *Mont.—Alp.* Jl—Au.

33. *D. attenuatum* (M. E. Jones) Rydb. Closely related to the preceding, but the raceme compound, resembling *D. glaucum* in leaf-form; stem about 1 m. high; sepals dark blue, long-attenuate, about 25 mm. long and about 3 times as long as the petals, nearly glabrous; upper petals white and veiny, the lower light blue. Along brooks: Utah. *Subalp.* Jl—Au.

34. *D. glaucescens* Rydb. Stems 3–5 dm. high, from a thick caespitose caudex; leaf-blades 5–7 cm. wide, finely puberulent, divided into 5–8 cuneate divisions, these 3-cleft, with lanceolate lobes; raceme simple, short; sepals dark blue, oval, obtuse, about 1 cm. long; upper petals yellowish white, tipped and variegated with blue; lower petals dark blue, with short acute lobes; ovary densely pubescent. Among rocks: Mont.—Ida.—Wyo. *Subalp.* Jl—Au.

35. *D. alpestre* Rydb. Stems several, about 1 dm. high, puberulent and viscid above, densely leafy; leaf-blades digitately divided into about 5 divisions, finely and sparingly puberulent when young, dark green; divisions cuneate-obovate, divided half-way into oblong mucronate lobes; inflorescence short and few-flowered; sepals dark blue, oblong, obtuse or the upper acute, viscid-puberulent; upper petals blue and yellowish, lower petals 2-cleft; lobes lanceolate; foliicles viscid-puberulent. Among rocks. Colo.—N.M. *Alp.* Jl.

36. *D. Ajacis* L. Annual; stem erect, 3–7 dm. high, branched, glabrous below, viscid-puberulent above; leaf-blades glabrous, finely dissected into narrowly linear lobes; flowers blue or purple, rarely white; sepals obovate, 1–1.5 cm. long, slightly pubescent; foliicles 12–15 mm. long, pubescent, with a very short beak. Around dwellings: N.Y.—Va.—Tex.—Mont; cultivated and escaped from gardens.

22. *ACONITUM* L. ACONITE, MONKSHOOD, WOLFSBANE.

Perennial herbs, with rootstocks or tubers. Leaves alternate; blades palmately lobed or divided. Flowers large, perfect, irregular, zygomorphic. Sepals 5, the upper or posterior one hooded or helmet-shaped. Petals 2–5, small, the posterior two hooded, clawed, concealed in the posterior sepal, the other three when present minute. Stamens numerous, hypogynous. Pistils 3–5, sessile, many-ovuled. Fruit many-seeded foliicles.

Hood boat-shaped, slightly saccate, almost semicircular in outline, stem slender, scarcely more than 3 dm. high, perennials with tubers.

Ultimate divisions of the basal leaves linear, linear-oblong, or linear-lanceolate.

Ultimate divisions of the basal leaves lanceolate
Hood helmet-shaped, deeply saccate, stem stout, 4–10 dm. high; root fleshy, usually fusiform.

Stem, at least the upper portion, viscid-pubescent.

Primary divisions of the leaves cleft or toothed, upper end of pedicels not glabrous.

Front-line of the hood strongly concave, i. e., the beak porrect, almost horizontal.

- Lower sepals one-half to two-thirds as long as the lateral ones
 Beak of the hood almost as long as the portion below. Inflorescence usually simple; follicles erect 3. *A. porrectum*
 Beak of the hood seldom one-half as long as the portion below. Inflorescence branched, follicles ascending-spreading. 4. *A. divaricatum*
 Lower sepals at least three-fourths as long as the lateral ones; leaf-segments rather broad 5. *A. Bakeri*
 Front-line of the hood almost straight, *i. e.*, the beak directed downward, or slightly porrect in *A. columbianum*
 Segments of the leaves linear-lanceolate 6. *A. ramosum*
 Segments of the leaves lanceolate.
 Lateral sepals very oblique, upper margin semi-reniform. 7. *A. columbianum*
 Lateral sepals moderately oblique; upper margin slightly if at all concave
 Flowers blue 8. *A. insigne*
 Flowers ochroleucous 9. *A. lutescens*
 Primary divisions of at least the stem-leaves entire, thickened portion of the pedicels glabrous. 10. *A. patens*
 Whole plant glabrous. 11. *A. glaberrimum*

1. *A. tenue* Rydb. Stem very slender, about 3 dm. high; leaves few; blades glabrous, thin, shining, almost pentagonal in outline, 5-7-divided to near the base, divisions rhombic, 3-cleft and often again cleft; inflorescence racemose, 2-6-flowered; hood 15-18 mm. long; lateral sepals rounded-ovate, 10-12 mm long; lower sepals oblong, obtuse. Damp cañons: Black Hills, S.D. Mont. Jl

2. *A. delphinifolium* DC. Stem erect, 3-7 dm. high, finely pubescent or glabrate; leaf-blades pentagonal in outline, glabrous, deeply divided to the base, and again cleft, inflorescence few-flowered, hood 2-2.5 cm. long; beak very short; lateral sepals broadly rounded-obovate, a little longer and about 3 times as broad as the oblong lower ones. Wet places: Alaska—Alta—B.C. Subalp—Alp. Jl—Au.

3. *A. porrectum* Rydb. Stem stout, 6-7 dm. high, leafy; basal leaves glabrous; blades reniform-pentagonal in outline, 6-10 cm. wide, 5-7-divided to near the base, divisions rhombic-oblanccolate, variously cleft above; inflorescence mostly racemose; sepals dark blue, ciliate on the margins, lateral sepals broadly obovate or semi-reniform, very oblique; lower sepals lanceolate or oblong. Moist places: Wyo.—N.M.—Ariz.—Utah. Submont.—Mont. Je—Au.

4. *A. divaricatum* Rydb. Stem 6-10 dm. high; leaf-blades about 1 cm. broad, finely pubescent, or in age glabrate, divided into about 5 rhombic-oblanccolate divisions, again cleft into broadly lanceolate or ovate-lanceolate lobes, inflorescence branched; sepals purplish or blue; hood narrow, 18-20 mm long, with a short porrect beak 6-10 mm. long; lateral sepals obovate and somewhat oblique; lower sepals lanceolate, follicles about 15 mm. long, finely viscid. Creek banks: Ida—Utah—(Yellowstone Park) Wyo. Submont.—Mont. Jl—Au

5. *A. Bakeri* Greene. Stem 4-6 dm. high; leaf-blades about 6 cm. broad, glabrous, divided into 5-7 rhombic-euneate divisions, twice cleft into broadly lanceolate lobes; inflorescence almost spike-like; sepals dark blue, more or less pubescent; hood about 18 mm long; lateral sepals very obliquely obovate; lower sepals oblong, obtuse; follicles nearly erect. *A. atrocyaneum* Rydb. Wet places in the mountains: Colo. Mont.—Subalp. Jl.

6. *A. ramosum* A. Nels. Stem 3-5 dm. high; leaf-blades 5-8 cm. broad, sparsely short-pubescent, divided into 3-5 oblanccolate divisions, these variously cleft into linear-lanceolate lobes; sepals blue, short-pubescent; hood 12-16 mm. long; lateral sepals obovate, somewhat oblique; lower sepals oblong or spatulate, about three-fourths as long and one-fourth to one-third as broad as the lateral ones; follicles 15-20 cm. long, more or less pubescent, straight. Open grassy ground: S.D.—Wyo. Submont.—Mont. Jl—Au.

7. *A. columbianum* Nutt. Stem 6-12 dm. high; leaf-blades 5-15 cm broad, glabrous or nearly so, divided into 3-5 rhombic divisions, these cleft and toothed with lanceolate teeth or lobes; sepals blue or purple, more or less pubescent; hood 15-20 mm. long; follicles usually more or less pubescent, 15-20 mm. long. *A. vestitum* Greene. Moist meadows: B.C.—Mont.—N.M.—Calif. Submont.—Subalp. Je—S.

8. *A. insigne* Greene. Stem 6-10 dm. high; leaf-blades 1-1.5 dm. broad, sparingly pubescent, divided into about 5 divisions, which usually are narrower, more deeply cut, more long-acuminate than in the preceding; sepals dark blue, rather long-pubescent; hood about 2 cm. long; follicles sparingly pubescent, 15-18 mm long. Mountain meadows: Colo.—Alta. *Submont.*—*Subalp.* JI—Au.

9. *A. lutescens* A. Nels. Stem 4-8 dm. high; leaf-blades 5-10 cm. broad, resembling those of *A. columbianum*; flowers like those of *A. insigne*, but smaller, ochroleucous. *A. ochroleucum* (A. Nels.) Rydb. Along mountain streams: NM—Mont—Ida. *Mont.* JI

10. *A. patens* Rydb. Stem 1.5 m. or more high; leaf-blades glabrous, those of the upper leaves divided into 3-5 lanceolate entire divisions; inflorescence much branched, with slender pedicels; sepals light blue, glabrous; hood about 2 cm long, narrow, straight, with a rounded apex; beak porrect, 6-8 mm. long; lateral petals obliquely broadly obovate; lower ones oblong, usually very obtuse. Along streams. Ida.—Utah. JI—Au.

11. *A. glaberrimum* Rydb. Stem almost 1 m. high; leaves 5-divided, thin, divisions oblanceolate to rhombic-oblanceolate in outline, 5-10 cm. long, irregularly doubly cleft above, inflorescence compound; branches and pedicels spreading or divergent, glabrous; flowers blue; lower sepals lanceolate; lateral ones very oblique, as broad as long, rounded; hood about 2 cm long, deeply saccate, elongate helmet-shaped; beak long-attenuate, very porrect or even ascending. Along streams: Utah—Ariz.

23. PÆONIA L. PÆONY.

Perennial herbs, with fascicled fleshy roots. Leaves ternately compound or dissected. Flowers perfect, regular. Sepals mostly 5. Receptacle somewhat concave, bearing a perigynous fleshy disk. Petals 5 or often more numerous. Stamens numerous, perigynous. Pistils few; styles short or none. Fruit consisting of few, coriaceous, many-seeded follicles. Seeds anatropous, with the seed-coat fleshy externally.

1. *P. Brownii* Dougl. Low glabrous and usually glaucous perennial; stem 2-4 dm high; leaves ternately or biternately divided, the divisions parted and cleft into oblong or oblanceolate lobes; sepals rounded, concave, green or purplish; petals 5-6, thick, dull brownish red; disk many-lobed, follicles 3-5, oblong, glabrous, about 2 cm. long and 1 cm broad. Dry ground: Calif—B.C.—Ida—Utah *Submont.*—*Mont.* Ap—Jl.

FAMILY 49. BERBERIDACEAE. BARBERRY FAMILY.

Shrubs, with yellow wood and inner bark. Leaves alternate, leathery, pinnately compound or simple, usually spinose-toothed. Flowers small, yellow, racemose or paniculate. Sepals 6, in two series, subtended by 2 or 3 bractlets. Petals 6, in two series, imbricate, with glands near their bases. Stamens 6; anthers opening by 2 valves. Ovary 1-celled; stigmas peltate; ovules few, erect or ascending. Fruit a few-seeded berry, in one species rather dry. Endosperm present.

Primary leaves reduced to spines; secondary ones fascicled in their axils, simple or unifoliate
 1. BERBERIS.
 Primary leaves pinnately compound, evergreen, no secondary ones in their axils
 2. ODOSTEMON.

1. BERBERIS (Tourn.) L. BARBERRY.

Spiny shrubs. Primary leaves transformed into simple or triple spines; secondary leaves fascicled in their axils, unifoliate or apparently simple, in ours deciduous. Racemes drooping, simple. Filaments toothless. Berries red, without a bloom, acid, edible.

1. *B. Fendleri* A. Gray. A shrub, 1-2 m. high, with shining purplish branches; spines weak, 8-15 mm. long; leaves short-petioled; blades spatulate

or oblanceolate, 2-6 cm. long, spinulose dentate or entire, shining; racemes 6-10-flowered; sepals ovate to obovate, the inner 5-6 mm. long; berry ellipsoid, about 6 mm. long. Mountains: Colo.—N.M. *Son.*—*Submont.* My.—Je.

2. ODOSTEMON Raf. OREGON GRAPES.

Unarmed shrubs. Leaves pinnately compound, with spinose-toothed evergreen leaflets. Flowers in erect fascicled or branched racemes. Filaments in ours with a pair of divergent teeth near the apex. Berries usually with a bloom. [*Mahonia* Nutt.]

Fruit becoming dry and inflated at maturity; leaflets less than 3 cm. long.

Fruit fleshy, not inflated at maturity, dark blue with a bloom, leaflets 3-10 cm. long

Leaflets 3-11: bud-scales ovate or rounded, deciduous

Prostrate, rising only 1-3 dm. over ground, leaves not very shining

Erect, 3-15 dm. high, leaves very shining

Leaflets 13-17, bud-scales large, lanceolate, coriaceous, persistent

1. *O. Fremontii*

2. *O. Aquifolium*

3. *O. nutkanus*

4. *O. nervosus*

1. *O. Fremontii* (Torr.) Rydb. Shrub or small tree, 1-4 m. high, with furrowed bark; leaflets 3-7 (rarely 9-11), coriaceous, ovate or oblong, grayish green, 1-3 cm. long, sinuately 3-9-toothed; petioles very short; racemes 3-8-flowered; berries at first blue, ovate-globose, 6-8-seeded. *Berberis Fremontii* Torr. Dry regions: w Tex.—Colo.—Nev.—s Calif.; n Mex. *Son.* Ap.—Je.

2. *O. Aquifolium* (Pursh) Rydb. Stoloniferous dwarf shrub; leaflets 3-7, oval or rarely ovate, acute to rounded at the apex, rounded or obliquely truncate at the base, coriaceous, pale and strongly reticulate beneath, sinuately 9-19-toothed, 3-9 cm. long; racemes many-flowered; berry ellipsoid-globose, 7-8 mm. long. *B. Aquifolium* Pursh. *B. repens* Lindl. *B. nana* and *B. brevipes* Greene. Hills and mountain sides: Alta.—Neb.—N.M.—Calif.—B.C. *Submont.*—*Mont.* Ap.—Je.

3. *O. nutkanus* (DC.) Rydb. A shrub, with yellowish smooth branches; leaflets 5-11, coriaceous, ovate or lance-ovate, 5-10 cm. long, only slightly paler beneath, less strongly reticulate, acute at the apex, usually obliquely truncate at the base, sinuately 11-25-toothed; raceme many-flowered; berry globose, about 1 cm. thick. *B. Aquifolium* Lindl., not Pursh. Hilly woods Ore.—Ida.—w Mont.—B.C. *Submont.* Ap.—Je.

4. *O. nervosus* (Pursh) Rydb. Stoloniferous shrub; stems 1-4 dm. high, with light brown bark; leaflets shining, glaucescent, thick-coriaceous, ovate to lanceolate, acute or acuminate at the apex, rounded at the base, spinulose-dentate, with 15-30 teeth; racemes many-flowered, 1-2 dm. long; berry rounded-ellipsoid, 8-10 mm. long. *B. nervosa* Pursh. Woods: B.C.—Ida.—Calif. *Submont.* Ap.—My.

FAMILY 50. PAPAVERACEAE Juss. POPPY FAMILY.

Annual or perennial herbs, or rarely shrubby plants, with colored sap and narcotic or acrid properties. Flowers perfect, regular. Sepals 2, or rarely 3, caducous. Petals 4, 8, or 12. Stamens numerous; filaments distinct, often dilated. Gynoecium of 2 to many united carpels, forming a 1-celled ovary; placentae parietal; ovules numerous, anatropous. Fruit a capsule; seeds numerous, with a fleshy or oily endosperm.

Hypanthium not developed, calyx not calyptrate, pod not elongate, 3-20-carpellary

Ovary many-lobed, in fruit breaking up into many follicles, which at maturity break

off into 1-seeded joints; leaves opposite

Ovary of two to many completely united and not separating carpels; leaves alternate.

Capsule opening by valves, at least at the summit

Unarmed herbs, sepals neither horned nor hooded

Petals in age thin, scarious-persistent, leaves basal, entire.

Petals not scarious-persistent, stem leafy, leaves pinnately divided or

lobed.

Prickly-leaved leafy-stemmed herbs, sepals hooded or horned, petals deciduous.

1. PLATYSTEMON

2. ARCTOMECON

3. CHELIDONIUM

4. ARGEMONE

Capsule opening by dentiform lids under the stigma.
 Hypanthium more or less developed, calyx calyptate, i. e., the two sepals wholly united into a funnelliform body, lifted off by the expanding petals, capsule elongate, 2-valved usually from the base to the apex.

5. PAPAVER.

6. ESCHESCHOLTZIA.

1. PLATYSTEMON Benth. CREAM-CUPS.

Small annuals, with opposite linear, entire leaves. Sepals 3, ovate, caducous. Petals 6, rarely more, yellow or yellowish. Stamens numerous; filaments usually dilated upwards, especially the outer ones, anthers linear to oval, dehiscent laterally. Pistils many, soon separate, torulose. Carpels in fruit moniliform and usually breaking up into 1-seeded joints.

1. *P. californicus* Benth. Low annual, 1-3 dm. high, hispid with long spreading hairs; leaves closely sessile, linear, obtuse, nerved; peduncles about 1 dm long or more; sepals varying from yellow to nearly white, 1-2.5 cm. long. Includes *P. rigidulus*, *P. remotus*, *P. termini* and two score or more species proposed by Greene and Fedde. Desert and arid regions: Calif.—s Utah—Ariz. *L. Son.*

2. ARCTOMECON Torr. & Frem.

Low, almost scapose annuals. Leaves basal or nearly so. Sepals 2. Petals 4, in age thin-scarious, persistent. Flowers perfect, drooping in the bud. Stamens numerous. Styles short; stigmas united, cordate-bilobed, 3-6, usually 4. Capsule ovoid or obovoid, 3-6-valved; valves alternating with the nerviform placentae. Seeds oblong with sinuose coat.

1. *A. humilis* Coville. Low annual, 1-2 dm high; leaves erect, lanceolate, usually 2-3-dentate at the apex, hirsute-ciliate and sparsely villous; scape 1-3-flowered, petals 4, suborbicular, white, about 18 mm long, filaments flattened; capsule 8 mm. long and 6 mm. thick; style short. Desert regions: Utah. *Son.*

3. CHELIDONIUM (Tourn.) L. CELANDINE.

Glabrous perennial herbs, with rootstocks. Leaves pinnately divided, crenately lobed, alternate. Sepals 2, yellowish green. Petals 4, yellow, imbricate in two series. Stamens many. Pistil formed of 2 carpels; ovary linear; style present; stigmas 2-lobed. Capsule linear, torulose, glabrous, 2-valved, dehiscent from the base, separating from the persistent placentae.

1. *C. majus* L. Stem 3-10 dm. high; leaf-segments 5-7, obovate-oblong, crenately lobed, petals 7.5-10 mm. long, rounded; capsule 2-5 cm. long, 2-3 mm. thick. Waste places: N.S.—N.C.—Utah; adv. from Eu. Ap-S.

4. ARGEMONE L. PRICKLY POPPY, THISTLE POPPY.

Annual or perennial herbs, or rarely shrubby, with yellow or white sap. Leaves alternate, clasping, pinnatifid or lobed, the divisions spinose-tipped. Flowers erect in bud, perfect. Sepals 2-3, hooded or horned, deciduous. Petals 4-6, showy, yellow or white. Stamens numerous; filaments slender. Ovary with 4-6 nerviform placentae; stigma sessile; ovules numerous. Capsule oblong, opening at the top by 4-6 valves. Seeds numerous, pitted; endosperm oily. [*Enomegra* A. Nels.]

Corolla yellow, leaves with light blotches
 Corolla white, leaves not blotched.

1. *A. mexicana*.

Prickles of the fruit not squarrose.

Stem unarmed, prickly, or bristly, but not hispidulous.

Leaves acutely lobed, horns of the sepals glabrous

Leaves round-lobed, horns of the sepals bristly.

Stem hispidulous-pubescent as well as densely prickly.

Prickles of the fruit strong, recurved-spreading, squarrose.

2. *A. intermedia*.

3. *A. rotundata*.

4. *A. hispida*.

5. *A. squarrosa*.

1. *A. mexicana* L. Stem 3-6 dm high, glabrous or sparingly prickly; leaves sinuate-pinnatifid, with spinulose dentate lobes; flowers sessile; calyx slightly bristly, its horns terete, glabrous, with stout spines, petals yellow, 1.5-2.5 cm. long, capsule ellipsoid, 2.5-3 cm. long, sparingly prickly, with stout spreading prickles. Hillsides, cultivated ground and waste places: W. Ind.—Fla.—Tex.—S Am., Africa, East Indies and Australia. Cult. and escaped, reported from Colo. Ja-D.

2. *A. intermedia* Sweet. Stem stout, 3-10 dm. high, sparingly but strongly prickly; leaves bluish green, glaucous, crisp, 1-3 dm. long; flowers usually short-peduncled; sepals sparingly prickly; horns conical, spreading, 5-8 mm. long; petals 3-4 cm. long; capsule oblong-fusiform, about 4 cm. long, with rather few strong prickles. Plains: S.D.—Tex.—n Mex.—(? Utah)—Wyo. *Plain—Submont.* Je—Au.

3. *A. rotundata* Rydb. Stem stout, densely and strongly prickly, but otherwise glabrous; leaves oval in outline, the cauline ones sessile and broadly auricled; flowers short-pedicelled or subsessile; calyx very bristly, its horns erect or slightly spreading, flattened; petals fully 4 cm. long; pod oblong-fusiform, 4 cm. long, densely bristly. Sandy soil: Utah—Nev. *Son.—Submont.* Je—Jl.

4. *A. hispida* A. Gray. Stem 3-6 dm. high; leaves deeply pinnately cleft, with oblong, coarsely spinulose-dentate lobes, prickly on the veins and hispidulous between; calyx densely bristly, its horns 8-10 mm. long, triangular, bristly; petals 3-4 cm. long; capsule oblong-fusiform, densely prickly with rather spreading prickles. *A. bipinnatifida* Greene. *Enomegra bipinnatifida* A. Nels. *E. hispida* A. Nels. Plains and hillsides: Kans.—N.M.—Utah—Wyo. *Son.—Mont.* Je—Jl.

5. *A. squarrosa* Greene. Stem 4-10 dm. high, prickly and hispid; leaves glaucescent, sinuate-pinnatifid and spinulose-dentate, hispid, 4-10 cm. long; flowers sessile; calyx densely bristly; horns broadly triangular, prickly and hispid; capsule nearly 5 cm. long. Plains: N.M.—Colo.—Kan. *Son.*

5. PAPAVER (Tourn.) L. POPPY.

Annual or in ours perennial herbs, with milky sap. Leaves alternate or in ours basal, lobed or dissected. Flowers drooping in the bud, perfect. Sepals 2, rarely 3. Petals 4, rarely 6. Stamens numerous. Ovary with 4-20 septiform placentae; style none; stigma disk-like; ovules numerous. Capsule globose or pyriform, opening by 4-20 tooth-like lids under the margin of the stigma. Seeds serobiculate, naked.

Leaves densely hirsute, lobes lanceolate or oblong.

Leaves glabrous or with a few bristles, lobes rounded.

1. *P. radicatum*.

2. *P. pygmaeum*.

1. *P. radicatum* Rottb. A caespitose and scapose perennial; leaves basal, numerous, 2-10 cm. long; blades 1-4 cm. long, usually twice ternately or pinnately dissected, coarsely hirsute; scape 5-15 cm. long, blackish hirsute; calyx densely black-hirsute, elliptic in bud; petals yellow, 1-3 cm. long; pod obovoid, fully 1 cm. long. *P. coloradense* Fedde. Exposed summits and bare hills: Greenl.—Lab.—N.M.—Alaska; arctic and subarctic Eurasia. *Alp.—Subalp.* Jl—Au.

2. *P. pygmaeum* Rydb. A caespitose and scapose perennial; leaves all basal, numerous, 2-3 cm. long; blade broadly ovate in outline, deeply cleft, sparingly hispid or glabrous; scape 4-6 cm. high, sparingly hirsute; calyx obovate in bud; petals yellow, 1 cm. or less long; pod obovoid, about 1 cm. long, densely bristly. *P. pseudocorydaliforme* Fedde. Exposed summits: Mont.—Alta—B C Alp. Jl—Au.

6. ESCHSCHOLTZIA Cham. CALIFORNIA POPPY.

Annual or perennial herbs, with dissected leaves, watery juice, and yellow flowers. Sepals 2, completely united into a cap, pushed off by the expansion of the petals. Petals 4, deciduous. Hypanthium more or less developed. Stamens numerous. Styles short and stout; stigmas 4-6, subulate. Capsule 2-valved, rarely 3-valved, usually from the base to the apex, the nerviform placentae remaining attached to the valves. Seeds globular, unappendaged.

Petals 8-25 mm. long, broadly cuneate; stem scapiform, stamens many.

Seeds superficially reticulate, lobes of the leaves oblong or linear, 1-2 mm. wide.

1. *E. mexicana*.

Seeds deeply pitted, lobes of the leaves linear-filiform, about 0.5 mm. wide.

2. *E. glyptosperma*.

Petals 3-6 mm. long, obovate, stem usually more or less leafy; stamens few.

3. *E. minuscula*.

1. **E. mexicana** Greene. Stout subacaulescent annual, glabrous, glaucescent; leaves coarsely dissected, with ascending divisions; scapes 1-2.5 dm. high; calyx firm, opaque, ovoid, taper-pointed, 14-16 mm. long; petals light yellow, 1-2.5 cm. long, spreading; receptacle with a reflexed margin; stamens 20 or more. Arid regions: Ariz.—s Utah—n Mex. *L. Son.* F—My.

2. **E. glyptosperma** Greene. Acaulescent annual, glabrous and glaucous; leaves numerous, blades rounded in outline, twice pedately ternate; peduncles 5-15 cm. long; calyx 8-10 mm. long, broadly ovoid, conic, shortly taper-pointed; petals 8-15 mm. long, spreading; receptacle not with an obvious rim; stamens 30 or more. Arid regions: Calif.—Nev.—s Utah—Ariz. *L. Son.* F—Ap.

3. **E. minuscula** Greene. Slender caulescent annual, 1-3 dm. high, branched near the base, leafy; leaves twice or thrice ternate, with linear spreading divisions; calyx about 4 mm. long, ovate, acute or acuminate; petals orange, spreading, receptacle without rim; stamens 8 or 12. *E. ludens* Greene. Arid regions: Nev.—Utah—Ariz.—Calif. *Son.* Ap—Je.

FAMILY 51. **FUMARIACEAE.** FUMITORY FAMILY.

Herbs, with alternate usually finely dissected leaves. Flowers perfect, irregular, in racemes or panicles. Sepals 2, scale-like. Petals 4, the outer ones spreading above, one or both spurred at the base, the inner smaller, thickened above, enclosing the stigmas. Stamens 6; filaments diadelphous. Gynoecium of 2 united carpels; ovary 1-celled, with 2 parietal placentae. Fruit a capsule, rarely indehiscent.

Both of the outer petals spurred at the base.

1. **BICUCULLA.**

One of the outer petals spurred

2. **CAPNOIDES.**

Ovules several or many, fruit an elongated capsule.

3. **FUMARIA.**

Ovules solitary, fruit an indehiscent nut

1. **BICUCULLA** Adans. DUTCHMAN'S BREECHES, BLEEDING HEART.

Perennial herbs, with horizontal, granular or tuberous rootstocks. Leaves basal, long-petioled, repeatedly ternately divided. Flowers perfect, irregular, in terminal racemes or panicles. Two outer petals spurred, loosely united, deciduous, their tips spreading, the inner petals crested, clawed, cohering by their tips. Stamens 6, in two bundles, opposite the outer petals, filaments diadelphous at the base. Ovary with two parietal placentae; style filiform. Capsule elongate, opening by two valves. Seeds 10-20, crested. [*Dicentra* Bernh.]

Flowers racemose; spur elongate, oblong, divergent.

1. *B. occidentalis.*

Flowers solitary, spur very short and rounded

2. *B. uniflora.*

1. **B. occidentalis** Rydb. Perennial, with a very short rootstock bearing numerous tubers; scape and leaves perfectly glabrous; leaf-blades twice ternate, the divisions twice pinnately divided into linear-oblong lobes, 1-2 cm. long; scape about 3 dm. high; petals pink, the outer about 1 cm. long, their spurs about 12 mm., divergent; crest of the inner petals prominent; capsule fusiform, with the style about 1.5 cm. long. *D. occidentalis* Fedde. Shady hillsides: Wash.—Ida.—Ore. *Submont.* Ap.

2. **B. uniflora** (Kellogg) Howell. Acaulescent perennial, with fascicled fusiform roots and a tuber-bearing crown; leaves twice or thrice ternate, with oblong divisions, slightly pubescent, about 1 dm. long; scape 1 dm. long or less, 1-flowered; corolla flesh-colored, about 15 mm. long; spurs represented by rounded sacks; outer petals strongly recurved. *D. uniflora* Kellogg. Mountains: Wash.—Wyo.—Utah—Calif. *Submont.—Mont.* Ap—Au.

2. **CAPNOIDES** Adans. CORYDALIS.

Annual, biennial, or perennial, caulescent herbs. Leaves alternate, bipinnately dissected. Flowers perfect, irregular, in racemes. Outer petals dissimilar, distinct, one of them spurred at the base, the two inner narrower, winged or crested, coherent at the apex. Stamens 6, in two bundles, opposite the outer

petals; filaments united above the middle. Ovary with two parietal placentae; style filiform. Fruit an elongated 2-valved capsule. Seeds numerous, crested. [*Corydalis* Vent.]

Annuals or biennials.

Plants low, ascending or diffuse; corolla yellow.

Pod glabrous.

Bracts narrowly lanceolate; pod pendulous, torulose.

Bracts ovate-lanceolate, ovate, or obovate, pod erect, not torulose

Pod covered with translucent vesicles.

Plants erect, tall, usually 3-6 dm. high; corolla rose or purplish, with purple tips.

Perennials with thickened roots; corolla white or tinged with purple.

Bracts spatulate or oblanceolate, about 1 cm. long, dorsal crest of the hood narrow.

Sepals reniform, laciniate

Sepals narrowly hastate, with large toothed basal lobes.

Bracts linear; dorsal crests of the hood obsolete.

Corolla 2 cm. long; sepals broadly ovate, obtuse, their auricles subentire, pod lance-obovoid

Corolla 1.5 cm. long, sepals ovate, acute, their auricles toothed, pod broadly obovoid.

1. *C. aureum*.

2. *C. montanum*.

3. *C. crystallinum*.

4. *C. sempervirens*.

5. *C. cusickii*.

6. *C. hastatum*.

7. *C. Brandegei*.

8. *C. brachycarpum*.

1. *C. aureum* (Willd.) Kuntze. Glabrous and more or less glaucous annual or biennial, diffusely branched, 1-4 dm. high; racemes 1-5 cm. long; leaves thrice pinnate; corolla 12-15 mm. long, golden yellow; spur one-half to two-thirds as long as the body, curved downward; pods 2-3 cm. long, about 2 mm. thick. *Corydalis aurea* Willd. *C. Engelmannii*, *C. macrorrhiza*, and *C. Albertae* Fedde. River banks, hillsides, and open woods: N.S.—Pa.—Tex.—Calif.—Alaska. *Plain*—*Mont.* *My*—*Au*.

2. *C. montanum* (Engelm.) Britton. Glabrous and glaucous biennial, branched at the base, 2-5 dm. high; leaves as in the preceding; corolla 15-20 mm. long, golden yellow; spur usually almost as long as the body, decidedly saccate at the end and somewhat turned upward; pod usually curved at the base, 2-3 cm. long, 3 mm. thick. *Corydalis aurea occidentalis* Engelm. *C. curvisiliquaeformis*, *C. bitimbata*, and (?) *C. hypocoiformis* Fedde. River banks, cañon, and copses: S.D.—Tex.—Ariz.—Utah; Mex. *Plain*—*Submont.* *Mr*—*Au*.

3. *C. crystallinum* (Engelm.) Kuntze. Glabrous and slightly glaucous annual, branched at the base, 1-3 dm. high; leaves thrice pinnatifid, with oblong small divisions; bracts ovate or ovate-lanceolate; corolla golden yellow, 12-15 mm. long; spur nearly as long as the body; pod erect, about 2 cm. long and 3 mm. thick. Fields and open grounds: Mo.—Ark.—Kans.—Mont. *Plain*—*Mont.* *Ap*—*Je*.

4. *C. sempervirens* (L.) Borkh. Glabrous and glaucous biennial, simple, 3-6 dm. high; leaves twice or thrice pinnatifid, with obovate divisions; racemes 3-10 cm. long; corolla 12-15 mm. long; spur short, one-third as long as the body or less; pod ascending, 3-4 cm. long, 1.5 mm. thick. *Corydalis glauca* Pursh. Rocky woods: N.S.—N.C.—Mont.—B.C.—Alaska. *Plain*—*Boreal.* *My*—*Au*.

5. *C. cusickii* (S. Wats.) Heller. Stout glabrous perennial, 6-15 cm. high, leaves thrice pinnatifid, 2-10 dm. long; ultimate divisions ovate or lanceolate, acuminate; corolla with the spur about 2 cm. long, white or lilac, with the tips of the inner petals violet; capsule ellipsoid, 1-1.5 cm. long. Mountains along water-courses: e Ore.—Ida. *Submont.* *Je*—*Jl*.

6. *C. hastatum* Rydb. Glabrous green perennial, 1-1.5 m. high, branched above; leaves 2-4 dm. long, thrice pinnatifid; ultimate divisions elliptic or oval, mucronate; corolla with the spur 15-18 mm. long, salmon-pink; hood barely crested. (?) *Corydalis Hendersonii* Fedde. Along water-courses: Ida.—Wash.

7. *C. Brandegei* (S. Wats.) Heller. Glabrous perennial, scarcely glaucous, 6-15 dm. high; leaves 2-3 dm. long, thrice pinnatifid, with oval or obovate, mucronate divisions; corolla 2 cm. long, with almost erect spur; pods pendent, 1.5 cm. long, 4 mm. thick. Mountains: Colo.—n N.M. *Mont.* *Je*—*Au*.

8. *C. brachycarpum* Rydb. Glabrous and glaucous perennial, with a thick root; stem 3-6 dm. high, branched above; leaves 2-3 dm. long, thrice pinnatifid; ultimate divisions lanceolate or lance-elliptic; corolla yellowish, the inner

3. FUMARIA (Tourn.) L. **FUMITORY.**

12. CAMELINA.

- Capsule globose, indehiscent, 1-2-seeded. 13. NESLIA.
- †† Pod long, several times as long as broad.
- * Pod scarcely beaked, merely tipped by a short style or a sessile stigma
- ‡ Pod terete or nearly so.
- Pubescence of simple hairs
- Seeds in two rows in each cell of the pod
- Seeds globose or oblong, turgid; valves of the pod nerveless; cotyledons accumbent.
- Petals with a median nectary, usually yellow
15. RADICULA.
- Petals without nectary, white
16. SISYMBRIUM.
- Seeds flattened; valves of the pod 1-nerved, cotyledons partly incumbent
17. TURRITIS
- Seeds in 1 row in each cell of the pod
- Pod subulate, tapering from the base to the apex.
18. ERYSIMUM.
- Pod cylindric or tapering both ways.
- Perennials with creeping rootstocks
46. SCHOENOCRAMBE.
- Annuals, or perennials with taproots
- Septum of the pod nerved, with longitudinal reticulations.
19. NORTA
- Septum of the pod nerveless, with transverse reticulations
20. BRAYA.
- Pubescence of forked hairs
- Flowers pedicelled, yellow to straw-colored, rarely white; leaves pinnatifid or lobed
21. SOPHIA
- Flowers sessile, rose or white, leaves toothed or entire
22. MALCOLMIA
- †† Pod 4-angled.
- Stem-leaves clasping by a cordate base.
23. CONRINGIA
- Stem-leaves not clasping
- Corolla white
24. ARABIDOPSIS
- Corolla yellow or purplish.
- Seeds plump; leaf-blades entire or toothed
- Hairs of the stem and leaves appressed, 2-branched, attached near the middle, partition of the pod not cross-veined
25. CHEIRINIA.
- Hairs of the stem and leaves spreading, branched, attached at the end, partition of the pod cross-reticulate
26. HESPERIS.
- Seeds flat, leaf-blades pinnatifid
27. CAMPE
- ** Pod with a long distinct beak
- Pods indehiscent, constricted between the seeds, which are separated from each other by false, spongy, transverse partitions
28. RAPHANUS.
- Pods opening by valves, without transverse partitions
- Beak flat and sword-like, 4-angled, or two-edged, contiguous with an internode, containing 1 seed
- Valves of the pod with 3 strong nerves.
29. SINAPIS
- Valves of the pod with 1 strong nerve
30. ERUCA.
- Beak elongated-conic, seedless
31. BRASSICA.
- b. Pod flattened parallelly to the broad partition
- Fruit orbicular, 1-celled, 1-seeded, indehiscent, sepals somewhat spreading
- Fruit not winged, pubescence of branched hairs, those of the fruit uncinata
32. ATHYSANUS
- Fruit winged, usually marked with fenestrations or sinuations on the margin; pubescence of simple hairs
33. THYSANOCARPUS.
- Fruit 2-celled, 2-several-seeded, dehiscent (in some species of *Draba* tardily so), sepals erect
- Pod orbicular
- Valves convex; filaments dilated and toothed near the base; plants stellate, leafy.
- Pod suborbicular, with flat margins, petals entire or nearly so.
34. ALYSSUM.
- Pod oblong, slightly if at all compressed, petals notched
35. BERTEROA.
- Valves flat; filaments not toothed; plant scapose, with simple hairs
36. IDAHOA
- Pod oblong, ovate or linear, rarely nearly orbicular; valves flat, or if convex not with flattened margins, filaments unappendaged.
- Valves nerveless
- Valves elastically dehiscent; seeds in one row; pod long.
- Stem naked below, 2-3-leaved, cotyledons thick, very unequal
37. DENTARIA.
- Stem leafy; cotyledons flat, equal.
38. CARDAMINE.
- Valves not elastically dehiscent, seeds in two rows; pod usually short.
39. DRABA.
- Valves nerved and reticulate, not elastically dehiscent.

- Anthers not subsagittate at the base
Pod short, from orbicular to linear-oblong. 39. *DRABA*.
Pod elongated-linear.
Cotyledons accumbent. 40. *ARABIS*.
Cotyledons incumbent 23. *CONRINGIA*.
Anthers subsagittate at the base.
Stigma 2-lobed, seeds margined; cotyledons strictly accumbent 41. *PARRYA*.
Stigma entire, capitate, seeds marginless; cotyledons obliquely accumbent. 42. *PHAENICAILIS*.
2. Anthers sagittate at the base
Calyx urn-shaped, closed; blades of the petals narrow, undulate-crisp.
Cotyledons accumbent, stem not succulent, flowers small. 43. *CARTIERA*.
Cotyledons incumbent; stem more or less succulent, flowers comparatively large 44. *CAULANTHUS*.
Calyx campanulate, open; petals ample
Pod flat, anthers neither curved nor twisted
Stigma 2-lobed
Lobes of the stigma over the placentae; perennials 41. *PARRYA*.
Lobes of the stigmas over the valves; annuals. 45. *STREPTANTELLA*.
Stigma entire, capitate, seeds marginless
Cotyledons obliquely accumbent, low perennials, with pink or purplish flowers. 42. *PHAENOCALYX*.
Cotyledons incumbent; tall leafy plants, with greenish flowers 46. *CHLOROCRAMBE*.
Pod terete or tetragonal; anthers curved or twisted (except in *Schoenocrambe*).
Sepals unequal, the lower longer; hairs, at least some of them, stellate or branched. 49. *HETEROTHRIX*.
Sepals equal or nearly so; hairs simple or none.
Sepals erect or ascending in anthesis
Stigma distinctly lobed, its lobes expanded over the septum.
Plants with creeping rootstocks 47. *SCHOENOCRAMBE*.
Plants with taproots 48. *THELYPODIOPSIS*.
Stigma entire or, if distinctly lobed, the lobes expanded over the valves
Stigma conical, outer sepals gibbous at the base 50. *HESPERIDANTHUS*.
Stigma truncate, sepals scarcely gibbous at the base
Septum of the pod without a distinct midrib 51. *THELYPODIUM*.
Septum of the pod with a strong midrib. 52. *PLEUROPHRAGMA*.
Sepals strongly spreading or reflexed in anthesis, soon deciduous 53. *STANLEYELLA*.
11 Pod terete, long-stipitate, sepals spreading or reflexed in anthesis, anthers curved and spirally twisted. 54. *STANLEYA*.

1. *ISATIS* L. WOOD.

Annual to perennial herbs. Flowers perfect, racemose. Sepals equal, ascending-spreading, not gibbous at the base. Petals yellow, entire, equal. Stamens 6, filaments not dilated, on a disk. Pod indehiscent, 1-celled, 1-(rarely 2-) seeded, oval to oblong, flattened contrary to the partition, winged all around, without style. Cotyledons incumbent.

1. *I. tinctoria* L. Biennial; stem 3-10 dm. high; leaves blue-green, the lower oblanceolate, entire or denticulate, the upper sagittate-clasping; racemes several; pod oblong, 12-15 mm. long, 5-7 mm. wide, rounded or retuse at the apex. Waste places. Utah; adv. from Eu.

2. *CARDARIA* Desv.

Perennial caulescent herbs. Leaves alternate, toothed, the upper clasping. Flowers perfect, in terminal panicles. Petals white. Stamens 6. Ovary sessile; styles slender, but short. Pod ovate, cordate at the base, acute at the apex, neither winged nor retuse; valves strongly convex. Seeds solitary in each cavity. Cotyledons incumbent.

1. *C. Draba* (L.) Desv. Erect perennial, 2.5-5 dm. high, hoary-pubescent, branched above; lower leaves oblanceolate, petioled, the upper oblong, ovate, or cordate, clasping, usually dentate; pod 3 mm. long and 4 mm. broad, papillose; style 1-2 mm. long. *Lepidium Draba* L. Waste places and cultivated ground: N.Y.—Fla.—Calif.—Ida.; adv. or nat. from Eurasia. Ap-Je.

3. LEPIDIUM L. PEPPERGRASS, CANARY-GRASS, BIRD-SEED.

Annual, biennial or perennial herbs. Pubescence if any of simple hairs. Leaves alternate, entire, toothed, lobed, or dissected. Flowers perfect, in racemes or panicles. Sepals 4, equal. Petals small, white or greenish, or wanting. Stamens often less than 6. Ovary sessile; styles short or wanting; ovules solitary in each cell, pendulous. Pods short, oblong to orbicular, transversely flattened, wing-margined or at least acute on the margins, notched at the apex. Seeds solitary in each cavity. Cotyledons incumbent or rarely obliquely accumbent.

Style evident, at least equalling the wing-margins.

Introduced annuals or biennials.

Upper leaves entire, perfoliately clasping.

Leaves all pinnatifid, none clasping.

Native perennials.

Pods 2-4 mm. wide.

None of the leaves pinnatifid.

Basal leaves oblanceolate, entire-margined, thick, stamens 2.

Basal leaves more or less toothed, thinner; stamens 6.

Basal leaves truncate and 3-toothed at the apex.

Basal leaves oblanceolate, acute at the apex, serrate-crenate.

Basal leaves at least pinnatifid

Segments of the basal leaves short, obovate or oblanceolate in outline, petals obovate.

Styles 2-3 times as long as the wing-margins, racemes in age more or less elongate.

Styles about 3 times as long as the wing-margins, leaves coriaceous, segments entire or merely round-toothed, obtusish, plant glabrous, stem few-leaved.

Styles about 2 times as long as the wing-margins; leaves not coriaceous, segments usually cleft or deeply toothed, acute.

Upper stem-leaves linear, entire, plant glabrous or the upper part of the stem slightly puberulent.

Leaves usually all pinnatifid, stem puberulent throughout.

Stem glandular-puberulent, pod oval or ovate, narrowed towards the apex.

Stem densely papillose-puberulent, pod orbicular.

Styles slightly exceeding the wing-margins; racemes numerous, short, plant puberulent.

Segments of the basal leaves elongate, linear, oblong, or lanceolate.

Only the lower leaves pinnatifid, pod broadly oval, style scarcely longer than the width of the wing-margins; petals orbicular.

Stem leaves except the uppermost also pinnatifid, pod narrower, acutish at both ends, style about twice as long as the width of the wing-margins, petals obovate to elliptic.

Plant low, 3 dm. high or less, leaves or their lobes narrowly linear.

Plant tall, 4-10 dm. high; upper leaves broadly linear or oblong.

Pods 6-8 mm. wide.

Style obsolete, or at least shorter than the width of the wing-margins, annuals or biennials.

Wing-margins of the fruit not produced at the apex into distinct lobes or teeth.

Pods glabrous or rarely minutely puberulent when young.

Petals conspicuous, at least equalling the sepals, spatulate or obovate.

Style distinct, but short, blades of the petals broadly obovate, much exceeding the sepals.

Style none, blades of the petals spatulate.

Pubescence, if any, of cylindrical or subulate hairs; petals well exceeding the sepals, at least in the earlier flowers.

Stem glabrous or nearly so.

Cotyledons accumbent; petals broadly spatulate.

Cotyledons incumbent; petals narrowly spatulate or oblanceolate.

Stem densely pubescent.

Pubescence of the stem of short, clavate hairs; petals about equalling the sepals.

Stem low, 1-3 dm. high, branched below; primary basal leaves oblanceolate, serrate.

Stem taller, 4-6 dm. high, simple below, branched above; primary basal leaves pinnatifid.

Petals none or minute, scarcely more than half as long as the sepals, linear or linear-spatulate.

1. *L. perfoliatum*.

2. *L. sativum*.

3. *L. integrifolium*.

4. *L. Vaseyanum*.

5. *L. crenatum*.

6. *L. scopulorum*.

7. *L. Crandallii*.

8. *L. montanum*.

9. *L. papilliferum*.

10. *L. brachybotryum*.

11. *L. alyssoideis*.

12. *L. Jonesii*.

13. *L. Eastwoodiae*.

14. *L. Fremontii*.

15. *L. idahoense*.

16. *L. virginicum*.

17. *L. texanum*.

18. *L. hirsutum*.

19. *L. ramosum*.

20. *L. simile*.

Plants branched near the base, petals usually present (except in *L. divergens*).

Racemes usually numerous, on short branches from the axils of the upper leaves, pods broadest below the middle; wing-margins narrow

Axillary racemes very short and dense, usually shorter than the leaves, petals more than half as long as the sepals

21. *L. ramosissimum*.

Axillary racemes at last elongate; petals very minute or lacking

22. *L. divergens*.

Racemes elongate, terminal, pods broadest above the middle, wing-margins fully 0.5 mm wide at the apex

23. *L. elongatum*.

Plant simple below, branched above, petals none; racemes elongate, terminal

24. *L. densiflorum*

Pods hirsute, at least on the margins.

Stem-leaves linear, mostly entire

25. *L. pubescens*.

Stem-leaves spatulate, toothed or lacinate.

26. *L. Georginum*.

Wing-margins of the fruit produced at the apex into acute lobes or teeth

27. *L. Fletcheri*.

Stem erect, 3-5 dm high

Stem decumbent, 3-15 cm. high

Pod obovate or elliptic, stamens 2, leaves linear or linear-spatulate

28. *L. Bourgeauanum*.

Pod ovate, stamens 4; basal leaves often pinnatifid.

29. *L. dictyotum*.

1. *L. perfoliatum* L. Annual or biennial; stems suberect, 2-4 dm. high, more or less pilose, lower leaves bipinnatifid into linear divisions; upper stem-leaves entire, cordate or reniform, clasping, glabrous; petals yellow, fully 1 mm. long, stamens 6; pod 4 mm. long, orbicular, broadly ovate, or rhombic-elliptic, slightly emarginate; style about equalling the width of the wings. Waste places: Utah, nat from Eu. My-Je.

2. *L. sativum* L. Glabrous, bright green annual; stem 3-5 dm. high, branched; lower leaves twice pinnate, 5-20 cm. long, with obovate or oblanceolate, toothed divisions; petals spatulate, white or pinkish, 2 mm long; stamens 6. pod obovate, 5 mm. long, glabrous, strongly winged above, emarginate; wing partly adnate to the style. Waste places: Que.—N Y—Mont.—B.C.; escaped from gardens, native of Eu. Plain—Submont. My-Au.

3. *L. integrifolium* Nutt. Stems few, 2-5 dm high, simple below, glabrous; leaves entire, fleshy; petals 2.5 mm. long, obovate; pod 4-5 mm. long, elliptic; style scarcely 1 mm. long. *L. utahense* Jones. *L. Zionis* A. Nels. Plains: Wyo.—s Wash.—Ariz. Son. Je.

4. *L. Vaseyanum* Thellung. Fruticose at the base; stems 2-4 dm. high, glabrous; lower leaves cuneate, 2-10 cm. long, the upper oblanceolate, entire, glabrous; petals clawed, 2 mm. long; pod ovate, 3-3.5 mm. long; style about 0.5 mm long. *L. spatulatum* Vasey, not Phil. Mountains and hills: Colo.—w Tex.—N M. Son. Je-S.

5. *L. crenatum* (Greene) Rydb. Stem 5-9 dm high, glabrous, simple; basal leaves 5-15 cm. long, petioled; upper stem-leaves sessile and more entire; petals short-clawed, 3 mm. long; pods ovate, 3-4 mm. long; style about twice as long as the wing-margins. *Thelypodium crenatum* Greene. Sage plains: Colo. Son. Jl.

6. *L. scopulorum* M. E. Jones. Somewhat woody at the base; stems several, rather simple, glabrous, 1.5-3 dm high; leaves coriaceous, glabrous, shining, with broad, obovate, entire or round-toothed divisions; petals clawed, 2 mm long; pod 3-4 mm. long, ovate; style 1 mm. long. Mountains: Utah—Ariz.—(? Wyo.) Submont.—Mont. Jl-Au.

7. *L. Crandallii* Rydb. Stems several, branched and leafy throughout, glabrous or puberulent above, 3-5 dm high; lower leaves pinnatifid, 5-7 cm. long, glabrous, with oblanceolate or oblong, entire or slightly toothed divisions; upper stem-leaves oblanceolate or linear, entire or toothed; petals clawed, about 3 mm. long, white; pods oval or ovate, about 4 mm. long, glabrous, slightly wing-margined above; style 1 mm. long. Valleys: Colo. Submont. My-Je.

8. *L. montanum* Nutt. Stems often several from the same root, 2-4 dm. high, more or less puberulent or hirsutulous; lower leaves bipinnatifid, with oblong or obovate divisions, the upper pinnatifid or toothed; petals clawed, 2 mm. long; pod ovate, 3-3.5 mm long; style about 0.75 mm. long. (?) *L. philonitum* Nels. & Macb. Plains: Wyo.—N.M.—Calif.—Ida.; Mex. Son.—Mont. My-S.

9. *L. papilliferum* (Henders.) Nels. & Macbr. Biennial; stem intricately branched, 1-2 dm. high, bushy; leaves pinnatifid, with oblong, acute divisions, 2-4 cm. long; raceme short and dense; petals white, twice as long as the sepal, pedicels in fruit spreading or recurved; pod suborbicular, notched at the apex, 3 mm. long, slightly papillose; style 0.6 mm. long. *L. montanum papilliferum* Henders. Sage-brush plains: Ida. Son. My-Je.

10. *L. brachybotryum* Rydb. Stem 2-3 dm. high, branched, puberulent throughout; basal leaves puberulent, bipinnatifid, with elliptic or obovate lobes, stem-leaves oblanceolate, pinnatifid or toothed; petals white, clawed, 2 mm. long; fruiting racemes short; pod rounded-ovate, 3 mm. long, wing-margined above. Dry valleys: Utah. Son. Je-Jl.

11. *L. alyssoides* A. Gray. Stems usually several, 2-5 dm. high, corymbosely branched, puberulent above; lower leaves pinnatifid with linear divisions, glabrous; upper leaves entire, narrowly linear; petals distinctly clawed, 2-3 mm. long; pod ovate, rarely oval or elliptic, about 4 mm. long; style about 0.5 mm. long. Plains and river valleys: Tex.—Ariz.—Utah—Colo. Son. Ap-S.

12. *L. Jonesii* Rydh. Perennial, with a short woody caudex; stems 2-3 dm. high, branched, glabrous; lower leaves pinnatifid with linear acute divisions; upper leaves entire, narrowly linear; racemes rather short and dense; petals white, about 3 mm. long, much exceeding the sepals; stamens 6; pod oval, about 4 mm. long and slightly over 2 mm. wide, glabrous, retuse; style about 1 mm. long. Dry places: Utah—Nev. Son.—Submont. Ap-Je.

13. *L. Eastwoodiae* Wooton. Perennial, with a woody base; stems 5-10 dm. high, corymbosely branched above; lower leaves 3-5 cm. long, pinnately divided, with oblong acute divisions; upper cauline leaves oblong-lanceolate to linear, usually entire; racemes short and crowded, petals elliptic, white, 3 mm. long, clawed; pods elliptic-ovate, emarginate. In rocky places: N.M.—Utah. Submont. Je.

14. *L. Fremontii* S. Wats. Shrubby below, 3-10 dm. high; stem glabrous and shining; lower leaves glabrous, pinnatifid, with linear divisions, the upper entire, linear, more or less fleshy; petals clawed, 3 mm. long; blades rhombic-obovate; pods 5-7 mm. long and fully as broad, orbicular or obcordate, scarcely winged; style 0.5-0.7 mm. long. Rocky and arid ground: Utah—Ariz.—Calif. L. Son. Ap-Je.

15. *L. idahoense* Heller. Stem 2-5 dm. high, sparingly and minutely pubescent, simple below, branched above; basal leaves spatulate, coarsely toothed or pinnatifid; lower stem-leaves oblanceolate, laciniately dentate, the upper linear and entire; petals white, clawed, about 2 mm. long; pod orbicular, about 3 mm. long. River banks, cañons, and foot-hills: Ida.—Colo. Son.—Submont. My-Je.

16. *L. virginicum* L. Annual or biennial; stem erect, more or less pubescent, leafy, corymbosely branched above; basal leaves lyrate-pinnatifid, more or less hirsute; lower stem-leaves oblanceolate, incised, the upper narrower, remotely dentate; petals clawed, about 1.5 mm. long; stamens 2-6; pod suborbicular, 3 mm. long, winged above, with rounded lobes. Waste places, fields, and roadsides: Que.—Fla.—Tex.—Utah; Mex., W. Ind., C. Am., S. Am.; naturalized in the Old World. Plain—Submont. Ja-D. (in the Rockies, My-Au).

17. *L. texanum* Buckl. Annual; stems glabrous or nearly so, 3-5 dm. high, branched above; lower leaves obovate or oblanceolate, somewhat pubescent, coarsely toothed; upper stem-leaves linear, mostly entire, glabrous and shining; petals slightly more than 1 mm. long; stamens mostly 2; pod orbicular, 3 mm. long, narrowly wing-margined above. *L. intermedium* A. Gray. *L. medium* Greene. Sandy soil: Mo.—Ala.—Tex.—Calif.—B.C.; Mex. Son. Ap-Au.

18. *L. hirsutum* Rydb. Annual or biennial; stem strict, 3-5 dm. high; lower leaves lyrate pinnatifid, with broad, toothed lobes, densely hirsute; upper leaves oblanceolate, coarsely and saliently toothed; petals white, 1 mm. long, clawed; stamens usually 2; pod rounded-oval, 3-3.5 mm. long. *L. inter-*

medium pubescens Greene. River banks and waste places: Colo.—Utah—Mex. Son.—Mont. Ap—Au.

19. *L. ramosum* A. Nels. Biennial; stem 1.5–3 dm. high, minutely granular-puberulent; basal leaves oblanceolate, coarsely serrate or pinnatifid; upper cauline leaves narrowly oblanceolate or linear, entire; petals about 1 mm. long; stamens 2; capsule orbicular, 3 mm. long, narrowly winged at the summit. Sandy soil: Mont.—Colo. Submont.—Mont. Je—Au.

20. *L. simile* Heller. Annual; stem 3–5 dm. high, more or less puberulent, lower leaves oblanceolate, pinnately lobed or parted, puberulent; upper stem-leaves entire, oblanceolate to linear; petals greenish white, 1.5 mm. long; stamens usually 2; pod fully 3 mm. long, winged above, obovate, notched, puberulent on the margin. River banks: Ida—Wash.—B C Son. My—Jl.

21. *L. ramosissimum* A. Nels. Biennial; stems 2–4 dm. high, slightly puberulent, profusely branched; basal leaves pinnately lobed or toothed or incised, stem-leaves oblanceolate, all except the uppermost more or less toothed; petals white, narrowly spatulate; stamens 2; pod ovate, 3 mm. long. Mesas and mountains: Colo.—Wyo. Submont.—Mont. Je—Au.

22. *L. divergens* Osterh. Biennial; stems 1.5–3 dm. high, branched from the base, minutely puberulent; basal leaves spatulate, coarsely toothed; stem-leaves linear or oblanceolate, few-toothed above or entire; petals none; stamens 2, pod elliptic, 3 mm. long; fruiting racemes numerous and short. Mountains: Colo—Utah. Submont.—Mont. Jl

23. *L. elongatum* Rydb. Annual or biennial, stem branched near the base, about 3 dm. high, granular-pruinose above; basal leaves spatulate or oblanceolate, about 4 cm. long, coarsely toothed, stem-leaves oblanceolate, entire or with a few small teeth, acutish; petals minute, linear-oblanceolate, or lacking; pods nearly orbicular, about 3 mm. broad, glabrous or slightly pruinose. Sandy soil and rocky hilltops: Ida—Wash. Son. My—Je.

24. *L. densiflorum* Schrad. Annual or biennial; stem 2–5 dm. high, puberulent, with short hairs, simple below, branched above; basal leaves oblanceolate or oblong, deeply incised-serrate or more or less pinnatifid, puberulent; stem-leaves mostly sharply toothed; petals rudimentary, linear-oblong, or none, stamens 2 or 4, pod obovate, about 3 mm. long. *L. apetalum* A. Gray, not Willd. Plains, prairies, waste places: Hudson Bay—Vt.—N.Y.—N.M.—B.C. Plain—Mont. Ap—O.

25. *L. pubecarpum* A. Nels. Annual; stem usually branched near the base, 8–30 cm. high, minutely puberulent; basal leaves oblanceolate, toothed; stem-leaves linear or oblanceolate, entire, or the lower remotely toothed; petals wanting, stamens 2; pod finely pubescent, broadly oval to orbicular, 2.5–3 mm. long. Dry rocky slopes and roadsides: Mont.—Wyo.—Utah—Nev. My—Jl.

26. *L. Georginum* Rydb. Apparently biennial, 1–2 dm. high; stems hirsute with short spreading hairs; lower leaves 1–5 cm. long, deeply pinnately divided with ovate lobes, more or less pubescent; petals spatulate, slightly exceeding the sepals; pods pubescent, rarely almost glabrous, rounded oval, 4 mm. long, broadly winged above, forming at the apex two broadly ovate obtuse lobes, over 0.5 mm. long. *L. lasiocarpum* Coult. & Nels, not Nutt. *L. Wrightii* Auth, not A. Gray. Arid regions: w Colo.—Ariz.—Nev. Son. Ap—Je.

27. *L. Fletcheri* Rydb. Annual or biennial; stem erect, 3–5 dm. high, puberulent with short cylindric spreading hairs; leaves narrow, pinnatifid, with linear divisions or saliently toothed, 2–5 cm. long, puberulent; petals none; stamens usually 2; pod glabrous, scarcely 3 mm. long, obovate in outline, glabrous; lobes of the wings nearly 0.5 mm., triangular-ovate, acutish or obtuse. Roadsides: Man.—Sask. Plain.

28. *L. Bourgeauanum* Thellung. Annual or biennial; stems decumbent, 1–1.5 dm. long; leaves linear or narrowly linear-spatulate, entire, pubescent with thickened hairs; petals rudimentary; stamens 2; pod obovate or elliptic, deeply notched at the apex; lobes of the wings acute and somewhat porrect. Plains: Sask. Plain.

29. *L. dictyotum* A. Gray. Annual; stems branched at the base, spreading, 3–10 cm. long, hirsute; basal leaves either linear, entire, or pinnatifid with distant linear lobes; stem-leaves narrowly linear; petals none or rudimentary; stamens 4; pod ovate, wing-margined, with prominent acute lobes, hirsute, 3 mm. long. Sandy places: Wash.—Ida.—Utah—Calif. *Son.* Mr-Je.

4. *THLASPI* (Tourn.) L. PENNY CRESS, PENNY-GRASS. WILD SWEET ALYSSUM.

Glabrous annuals or perennials, with undivided and often clasping leaves. Flowers racemose, perfect. Sepals equal. Petals white, or rarely pink or purplish, obovate or oblanceolate. Stamens free, unappendaged; anthers short, oval. Styles slender or none; stigma small, entire. Capsules orbicular, oblong or cuneate; valves strongly keeled, often winged, especially towards the apex. Seeds 2–8 in each cell.

Pods orbicular in outline, broadly wing-margined and deeply notched at the apex. sepals green; annuals. ¹ *T. arvense*

Pods obovate or oblanceolate-cuneate in outline, with narrow margins, acute, truncate or slightly notched at the apex, sepals with white or rarely purplish margins, perennials.

Petals 2.5–3 mm long; pod oblanceolate-cuneate, 2–2.5 mm wide ² *T. parviflorum*

Petals 4–7 mm long, pods cuneate or obovate-cuneate, 3 mm. or more wide

Pods acutish at the apex, neither emarginate nor retuse ³ *T. californicum*.

Pods rounded or truncate at the apex, emarginate or retuse

Pods rounded at the apex, sinus narrow

Caudex rather slender, stem 1–2 dm. high, petals spatulate, about 5 mm long ⁴ *T. Nuttallii*

Caudex stout, densely caespitose; stem less than 1 dm. high; petals broadly obovate, 6–7 mm. long ⁵ *T. coloradense*.

Pods truncate or nearly so at the apex, sinus very broad and open

Stem 2–3 dm. high, stem-leaves ample, broader than the basal ones, sepals green, with white margins. ⁶ *T. glaucum*

Stem 1 dm. or less; stem-leaves reduced; sepals and often also petals purplish. ⁷ *T. purpurascens*.

1. *T. arvense* L. Annual, glabrous; stem 1.5–4.5 dm. high; basal leaves early deciduous, petioled; blades oblanceolate; stem-leaves oblong or elliptic, dentate, the upper auricled and clasping at the base; petals about 4 mm. long, oblanceolate or spatulate; pod 12–18 mm. long, 10–15 mm. broad. Waste places and roadsides: Lab.—Fla.—Colo.—Utah—B.C.; adv. or nat. from Eu. *Plan*—*Submont.* My-Jl.

2. *T. parviflorum* A. Nels. Stems few, 1–3 dm. high; lower leaves rosulate at the base, glabrous, 5–20 mm. long, short-petioled, elliptic or oval; stem-leaves 5–12 mm. long, oblong, sagittate and clasping at the base; petals oblanceolate, pod 5–7 mm. long, scarcely winged, slightly emarginate. Open valleys: Wyo.—Mont. *Submont.*—*Mont.* Je.

3. *T. californicum* S. Wats. Stems 1–2 dm. high, simple; basal leaves petioled, 1–3 cm. long, oval or spatulate; stem-leaves oval, 5–10 mm. long, sagittate and clasping at the base; petals spatulate, 4–5 mm. long; pod cuneate, 5–7 mm. long. Mountain valleys: Mont.—Utah—Calif.—Wash. *Submont.*—*Subalp.* Je—Au.

4. *T. Nuttallii* Rydb. Stems solitary or few, 1–2 dm. high, leafy; basal leaves petioled, 1–2 cm. long, glabrous, oval, spatulate, or obovate; stem-leaves rounded-oval, about 1 cm. long, cordate and clasping at the base; pod cuneate-obcordate, about 7 mm. long. Valleys and hillsides: Mont.—Colo.—Wash. *Submont.*—*Mont.* My-Jl.

5. *T. coloradense* Rydb. Stems 2–8 cm. long; basal leaves broadly spatulate, 1–2 cm. long, fleshy, sinuately crenate or subentire; stem-leaves oblong or obovate, 3–10 mm. long, obtuse; pod obovate, about 6 mm. long; wing-margins very narrow. Alpine peaks. Colo.—Utah. *Alp.*—*Mont.* Jl—Au.

6. *T. glaucum* A. Nels. Stems leafy, 1–3 dm. high; basal leaves petioled, 2–3 cm. long, oval or obovate, glabrous and glaucous, entire or repand; stem-leaves ovate-oblong, cordate and clasping at the base; petals about 6 mm. long; pod cuneate, wing-margined above. Valleys: Mont.—Colo.—Utah. *Submont.*—*Subalp.* Je—Jl.

7. *T. purpurascens* Rydb. Stems generally several, less than 1 dm. high; basal leaves oval or broadly spatulate, 2-3 cm. long, petioled, usually more or less sinuate-dentate; stem-leaves ovate, obtuse, with a truncate base, closely sessile; petals about 6 mm. long; pod triangular-obovate, distinctly winged above, 7-8 mm. long. Alpine peaks: Colo.—Utah—Ariz.—N.M. *Subalp.*—*Alp.* *My-Jl.*

5. *BURSA* Weber. SHEPHERD'S PURSE.

Annual caulescent herbs, pubescent with branched hairs. Leaves alternate, entire, lobed, or pinnatifid. Flowers perfect, in elongate racemes. Petals white, spatulate. Stamens free and unappendaged. Styles almost none; stigma simple. Pod strongly flattened contrary to the narrow septum, cuneate or obcordate, more or less deeply notched at the apex, the valves boat-shaped. Seeds numerous in each cavity, marginless. Cotyledons accumbent.

1. *B. Bursa-pastoris* (L.) Britton. Annual or winter biennial; stem 1-5 dm high; lower leaves usually lyrate-pinnatifid, lobed or merely dentate, stem-leaves sessile, hastate or sagittate at the base; petals white, 2 mm. long, spatulate, pods 6-8 mm. long, triangular. *Capsella Bursa-pastoris* Medic. Waste places. Lab.—Fla.—Calif.—B C; S. Am.; nat. from Eurasia. *Plain*—*Subalp.* *Ja-D.*

6. *HUTCHINSIA* R. Br.

Low spreading annuals, minutely stellate or glabrous. Leaves alternate, entire to pinnately lobed. Flowers perfect, in at last elongate racemes. Stigma sessile. Petals minute, narrow, white. Pods strongly flattened contrary to the narrow septum, elliptic, not at all obcordate or notched at the apex. Seeds numerous in each cell. Cotyledons accumbent.

1. *H. procumbens* (L.) Dev. Stems branched at the base, slender, 5-20 cm long; lower leaves pinnatifid, lobed, toothed, or entire, minutely stellate; upper leaves entire, oblanceolate or linear; sepals and petals about 1 mm. long; fruiting pedicels divaricate, pod elliptic, about 4 mm. long. Moist ground: Lab.—Newf.—Colo.—Calif.—B.C. *Plain*—*Submont.* *Mr-Je.*

7. *SMELÓWSKIA* C. A. Meyer.

Low caespitose perennials, with a suffruticose caudex and cinereous stellate pinnatifid leaves. Flowers perfect, racemose. Sepals subequal, somewhat spreading. Petals obovate, exserted, white or ochroleucous or tinged with purple. Pod lanceolate or ovate, more or less obcompressed; valves strongly keeled. Stigma sessile.

Basal leaves merely lobed, cuneate to oblanceolate in outline, pod 5-6 mm long, tapering towards the base

1. *S. lobata*.

Leaves all deeply pinnatifid

Pod ovate, 4-5 mm long, obtuse at the base; calyces and pedicels densely villous; leaves white-villous

2. *S. ovalis*.

Pod lanceolate or oblanceolate, 7-12 mm long, tapering at each end

Segments of the basal leaves spatulate or oblong

3. *S. americana*.

Segments of the basal leaves linear or linear-oblong.

4. *S. lineariloba*.

1. *S. lobata* Rydb. Stems 1 dm. or less high; stem-leaves pinnatifid; sepals densely villous, 3 mm. long, ovate, acute; petals white, clawed, rounded-obovate; pod glabrous, about 5-6 mm long, oblanceolate; style very short. High mountains. Alta.—Mont. *Subalp.* *Je-Jl.*

2. *S. ovalis* M. E. Jones. Stems about 1 dm high, densely white-villous and stellate, basal leaves floccose-stellate, pinnately divided into 5-7 oblong, entire, or 2-3-cleft divisions; petals clawed, with rounded-obovate blades; pods obtuse at the base. High mountains: Wash.—Alta.—Calif. *Mont.*—*Subalp.* *Jl-Au*

3. *S. americana* Rydb. Stems 1-2 dm. high; leaves finely but not densely stellate, petals long-clawed, spatulate; pod 7-12 mm. long, tapering at both ends. High mountains: Mont.—Colo.—Utah—Ida. *Mont.*—*Alp.* *Je-Jl.*

4. *S. lineariloba* Rydb. Stems about 1 cm. high, few-leaved; leaves 2-5 cm. long, finely stellate, the petioles also ciliate; petals clawed, 5-6 mm. long,

broadly spatulate; fruit 11–12 mm. long and about 1 mm. wide, tapering at both ends. High mountains: Colo.—Utah—Alta. *Alp.—Subalp.*

8. DITHYREA Harv.

Stellate caulescent annuals or perennials. Flowers perfect, racemose. Sepals ovate or oblong, erect or spreading, pubescent. Petals broadly spatulate, with slender claws, white or purplish. Stamens 6, free and unappended; anthers sagittate, linear. Pods didymous, strongly obcompressed; cells sub-orbicular. Stigma sessile, large, simple. Cotyledons accumbent.

1. **D. Wislizeni** Engelm. Perennial or biennial with a taproot; stems cinereous-stellate, 3–6 dm. high; leaves numerous, lanceolate, sinuately dentate, cinereous-stellate, 3–6 cm. long; petals light yellow, 6 mm. long, long-clawed; pedicels in fruit divaricate; cells of the fruit obliquely obovate, flat, margined, about 5 mm. wide. Arid regions: Tex.—Ariz.—Utah. *Son.*

8. PHYSARIA A. Gray. DOUBLE BLADDER-POD.

Stellate, caespitose perennials with taproots. Flowers perfect, racemose. Sepals oblong, erect or ascending, equal at the base. Petals spatulate, yellow. Stamens 6; anthers sagittate, linear. Fruit more or less distinctly didymous, inflated or obcompressed. Styles slender. Cotyledons accumbent.

Cells of the pods much inflated, the upper sinus acute, narrow.

Pods deeply cordate at the base, lower sinus almost as deep as the upper

Pubescence short and close

Pubescence long and loose

Pods not cordate at the base or slightly so, lower sinus none or very shallow.

Cells of the pods 5–10 mm. in diameter, without ridges on the sides.

Some of the basal leaves more or less fiddle-shaped

Leaves of the decumbent flowering stems reduced, terminal lobe of the basal leaves rounded or reniform, very obtuse, entire

Leaves of the ascending flowering stems ample, terminal lobes of the basal leaves rhombic or ovate, acute or sometime obtuse, sinuate

None of the basal leaves fiddle-shaped.

Basal leaves oblanceolate or spatulate, acute, 2–4 cm. long; pods slightly cordate at the base.

Basal leaves rounded-obovate, 4–10 cm. long; pod acutish at the base.

Cells of the pods 10–18 mm. in diameter when fully developed, ridged on the sides.

Cells of the pods not much inflated, the upper sinus shallow, open.

1. **P. didymocarpa** (Hook.) A. Gray. Stems numerous, 3–15 cm. long, decumbent to erect; basal leaves 1–8 cm. long, with margined petioles and broadly obovate, entire or sinuately toothed blades, finely and closely stellate; petals 8–14 mm. long, spatulate; pod 7–15 mm. in diameter. *P. macrantha* Blankinship. Sandy or rocky hills and plains: Sask.—Colo.—Utah—Alta. *Plain—Mont. My—Jl.*

2. **P. lanata** (A. Nels.) Rydb. Stems erect or ascending, 1–2 dm. high; basal leaves numerous, 4–8 cm. long; blades broadly obovate to flabelliform-spatulate, sinuate-dentate; petals about 8 mm. long, oblanceolate; pods about 12 mm. in diameter. *P. didymocarpa lanata* A. Nels. Rocky slopes and rolling plains: n Wyo. *Submont. Je—Jl.*

3. **P. vitulifera** Rydb. Stems ascending or decumbent, 1–2 dm. high; basal leaves numerous, the larger 4–5 cm. long; terminal lobe nearly orbicular to broadly obovate, sub-entire, obtuse; lateral lobes 1–2 pairs, much smaller; petals clawed, 8–9 mm. long; fruit obtuse at the base, deeply divided above, cells 5 mm. in diameter. Dry places in the mountains: Colo. *Mont. My—Jl.*

4. **P. floribunda** Rydb. Stems numerous, ascending or almost erect, 1–2.5 dm. high; basal leaves less crowded and more erect than in the preceding, oblanceolate or spatulate, sinuately toothed, usually acute, 5–10 cm. long; petals bright yellow, 8–9 mm. long; fruit obtuse or slightly cordate at the base, deeply divided above; cells about 8 mm. in diameter. Sandy soil, in mountain valleys: Colo. *Submont.—Mont. Ap—Jl.*

5. *P. acutifolia* Rydb. Stems 4-6 cm. long, ascending or depressed; basal leaves numerous, oblanceolate or obovate, acute, entire or slightly wavy, very finely stellate; fruit small, obtuse or slightly cordate at the base, deeply divided above, 4-6 mm. in diameter. (?) *Lesquerella pruinosa* Greene. Mountains: Colo.—Wyo. *Submont.*—*Mont.*

6. *P. brassicoides* Rydb. Stems about 1 dm. high, ascending; basal leaves large, with winged petioles almost orbicular in outline, sinuate-dentate, 2.5-5 cm. in diameter; fruit almost obcordate, acute at the base, deeply divided above, 8-10 mm. long and 5-8 mm. in diameter. Cañons and bad lands: Neb.—N.D. *Plain.* Je.

7. *P. Newberryi* A. Gray. Stems 8-20 cm. high, decumbent at the base; basal leaves 3-10 cm. long, with margined petioles, finely stellate-canescant, obovate or spatulate, entire or sinuate-dentate; petals oblanceolate, about 1 cm. long; pod deeply cleft above, slightly so below. Dry mountains and hills: N.M.—Ariz.—Nev.—Utah. *Submont.*—*Mont.* My-Jc.

8. *P. Geyeri* (Hook.) A. Gray. Stems ascending or decumbent, 5-15 cm. long; basal leaves 2-5 cm. long, with margined petioles, obovate to nearly orbicular, finely stellate, sinuately-toothed or entire; petals 8-12 mm. long, spatulate; pods obcordate, about 6 mm. wide and 3 mm. thick. Dry hillsides: Wash.—Mont.—Wyo. *Submont.* My-Jl

10. *LESQUERELLA* S. Wats. BLADDER-POD.

Annual or tufted perennial, stellate herbs. Leaves entire or lobed, the blades linear to broadly spatulate or orbicular, the basal ones clustered. Flowers perfect, racemose. Sepals oblong, equal at the base; petals spatulate, yellow. Stamens 6; anthers linear, sagittate. Pods inflated, subglobose, ellipsoid, or ovoid, style slender, stigma entire, cells 2-16-seeded. Seeds rarely margined. Cotyledons accumbent.

Ovary and pod stellate-pubescent.

Pod ovoid or ellipsoid

Pod distinctly compressed and acute at the apex.

Pod 6-8 mm. long, plant usually more than 1 dm. high

Basal leaves broadly oval; septum of the pod elliptic in outline; style equalling the pod 1. *L. Shearzi*

Basal leaves oblanceolate to obovate, septum of the pod ovate in outline, style much shorter than the pod 2. *L. curripes*

Pod 3-5 mm. long, plant usually 1 dm. or less high.

Basal leaves linear-oblanceolate or linear

Pod strongly compressed above

Leaves narrowly linear-oblanceolate; plant pulvinate.

Leaves narrowly linear, plant multicapitous, with a subterranean

woody caudex

Pods slightly compressed

Basal leaves spatulate, pod not strongly compressed above.

Plant densely pulvinate, 2-5 cm. high, leaves 2 cm. long or less; pedicels erect or nearly so 6. *L. condensata*

Plant caespitose, 5-10 cm. high, leaves about 2 cm. long or more, basal leaves oblanceolate-spatulate, pedicels spreading, S-curved.

7. *L. spatulata*.

Pod not compressed above

Basal leaf-blades rounded or broadly spatulate

Stem-leaves small, generally less than 1 cm. long, linear-oblanceolate

Basal leaf-blades obovate-spatulate, style shorter than the pod

Basal leaf-blades rhombic-ovate, style longer than the very acute pod

Stem-leaves oblanceolate or obovate, 1-2 cm. long 10. *L. montana*

Basal leaf-blades linear-oblanceolate, stem-leaves narrowly so,

11. *L. arenosa*.

Pod globose.

Plant perennial

Pod 2-3 mm. in diameter.

Basal leaf-blades spatulate or oblanceolate.

Stem very slender; stem-leaves oblanceolate, 1-3 cm. long.

Plant 5 cm. or less high; pod less than 2 mm. broad, petals purple.

12. *L. rosea*.

Plant usually more than 5 cm. high; pod 2-3 mm. broad; petals yellow.

- Pedicles ascending. 13. *L. versicolor*
 Pedicels in fruit recurved 11. *L. arenosa*
 Stem stouter, strict; stem-leaves linear, 2-6 cm. long. 14. *L. ludoviciana*.
 Basal leaf-blades broadly oval, ovate, or elliptic.
 Basal leaves repand-dentate, stems stout; raceme loose, pedicels re-
 curved 15. *L. Macounii*
 Basal leaves entire, stem slender; racemes congested, pedicels upcurved
 16. *L. utahensis*
 Pod 5-6 mm in diameter; stem-leaves broadly spatulate. 17. *L. macrocarpa*
 Plant annual. 18. *L. Gordoni*.
 Ovary and pod glabrous, globose.
 Plant annual. 18. *L. Gordoni*
 Plant perennial
 Basal leaf-blades oblanceolate, stem-leaves narrowly so.
 Plants usually more than 3 dm. high, flowers and fruit corymbose.
 Plant usually less than 3 dm. high; inflorescence at least in fruit elongate,
 racemose. 19. *L. Engelmanni*
 Basal leaf-blades broadly oval. 20. *L. stenophylla*
 21. *L. ovalifolia*
1. *L. Shearia* Rydb. Stems several, ascending, 1-2 dm. high; basal leaves 3-4 cm. long; blades broadly oval or ovate; stem-leaves oblanceolate, about 2 cm. long, sessile; pedicels in fruit bent S-shaped; pods erect, 7-8 mm. long, acute, compressed above. Creek banks and foot-hills. Colo. *Submont.* Je-Jl
 2. *L. curvipes* A. Nels. Stems tufted, numerous, adurgent, 1.5-3 dm. high; basal leaves with oblanceolate to obovate blades; stem-leaves linear or oblanceolate, pedicels S-curved, about 1 cm. long; pod ovate in outline, gibbous at the base, flattened at the apex, about 8 mm. long. Dry mountains: Colo.—Mont. *Submont.*—Mont. My-Je.
 3. *L. alpina* (Nutt.) S. Wats. Stem 2-10 cm. long, erect or adurgent; basal leaves 2-5 cm. long; stem-leaves narrowly linear; petals about 6 mm. long, pods usually erect, ovoid; body about 4 mm. long; style slightly longer; septum usually perforated. Dry hills and plains: Mont.—Utah—Colo.—N.D. *Submont*—*Subalp.* Je-Jl.
 4. *L. parvula* Greene. Stems 1-4 cm. high; leaves all narrowly linear, silvery stellate; pods ovate, 4-5 mm. long, erect; style slightly longer; septum usually perforated. High mountains: Colo. *Subalp.*—*Alp.* Je-Jl.
 5. *L. intermedia* (S. Wats.) Heller. Pulvinate-caespitose; stems numerous, 5-10 cm. high, leafy; leaves oblanceolate or linear-oblanceolate; petals fully 1 cm. long; pedicels in fruit erect; pod 4-5 mm. long, ovoid; style of about the same length; septum usually entire. Arid regions: N.M.—Ariz.—Utah. *Son.* My-Je.
 6. *L. condensata* A. Nels. Stems numerous, 3-5 cm. (rarely 7 cm.) high; leaves spatulate, 8-20 mm. long, inflorescence short and corymbiform, petals 6-7 mm. long; pod ovoid, slightly compressed, 5 mm. long and about equalling the style; septum usually with a narrow perforation. Rocky slopes of the foot-hills: Mont.—Wyo. *Submont.* My-Je.
 7. *L. spatulata* Rydb. Stems 3-10 cm. high; stem-leaves few, linear; petals spatulate, 7-8 mm. long; pod ovoid, about 5 mm. long; style slightly shorter; septum not perforated. (?) *L. nodosa* Greene. Dry hills: Man.—Neb.—Utah—Mont. *Plain*—*Submont.* Je-Jl.
 8. *L. prostrata* A. Nels. Stems many, spreading; petals about 7-8 mm. long; pedicels in fruit ascending, recurved; pod 5-6 mm. long, ovoid, septum mostly perforated. Gravelly slopes: Sask.—Colo. *Plain*—*Submont.* Je
 9. *L. Wardii* S. Wats. Stems decumbent; basal leaves long-petioled; blades 1-3 cm. long, 1-2 cm. wide; petals 7-9 mm. long; fruiting pedicels ascending; pod ellipsoid, terete or obcompressed; body 6 mm. long. Mountains: Utah *Mont.*—*Subalp.* Je-Jl.
 10. *L. montana* (A. Gray) S. Wats. Stems decumbent, 1-2 dm. high; blades ovate or broadly spatulate, often sinuate; petals spatulate, about 1 cm. long; fruiting pedicels more or less S-curved; pod ellipsoid, 7-10 mm. long, not compressed; style slightly shorter. *L. rosulata* A. Nels. a depauperate form. Mountains: Wyo.—N.M.—Utah. *Submont.*—*Subalp.* My-Je.

11. *L. arenosa* (Richards.) Rydb. Stems slender, decumbent or ascending, 1-3 dm. high; petals 6-8 mm. long; fruiting pedicels spreading, recurved; pod globose or slightly ellipsoid, 4-5 mm. long, shorter than the style. *L. Lunelli* A Nels. Hills and plains: Man.—S D.—Colo.—Mont.—Sask. *Plain—Submont* Je—Jl.

12. *L. rosea* Greene Stems slender, 5 cm. or less high; basal leaves about 1 cm long; blades ovate or ovate-lanceolate; stem-leaves few, oblanceolate, sessile; petals rose-purple; pod 2 mm. thick, shorter than the style. Plains: Sask.—Alta. *Plain.* Je.

13. *L. versicolor* Greene. Stems decumbent, 2-3 dm. high; basal leaves few and small, blades oval or oblanceolate, entire or toothed; stem-leaves oblanceolate; petals sulphur-yellow, changing into pink; pod 3 mm. thick; style 4 mm long. Stony mountains. Man.—Sask. *Plain.* Je.

14. *L. ludoviciana* (Nutt) S. Wats. Stems erect or decumbent at the base, 1-4 dm high; basal leaves linear-oblanceolate, 3-10 cm. long, entire or repand, petals 7-8 mm. long; pedicels in fruit spreading and recurved; pods 4-5 mm. long; style about the same length. *L. argentea* (Pursh) MacMill., not S Wats. Plains and hills: Man.—Kans.—Colo.—Mont. *Plain—Submont.* My—Jl

15. *L. Macounii* Greene. Stems several, decumbent, 1-1.5 dm. high; basal leaf-blades oval or elliptic, repand-dentate, pedicels spreading, recurved; petals pale yellow; pods 3-4 mm. long, slightly shorter than the styles. Dry plains: Alta. *Plain* Au

16. *L. utahensis* Rydb. Stems ascending, 5-10 cm. (seldom 15 cm.) high; basal leaves 3-4 cm. long; blades oval or obovate; stem-leaves smaller, oblanceolate or spatulate; petals yellow, about 8 mm. long, pedicels in fruit ascending; pod almost spherical or slightly obovate, 3-4 mm. wide; style 4-5 mm. long, much longer than the pod. Dry hills: Utah. *Submont.—Mont* Je—Jl.

17. *L. macrocarpa* A Nels. Stems decumbent, 7-15 cm. high; basal leaf-blades orbicular or obovate; petals 5-7 mm. long, spatulate; pedicels in fruit spreading, recurved; body of pod 5-8 mm. thick; style 2-3 mm. long. Clay flats and ridges: Wyo. *Plain.* Je.

18. *L. Gordonii* (A. Gray) S. Wats. Annual or perhaps biennial; stems 1-3 dm high, erect, slender, leaves narrowly oblanceolate, entire or repand; petals 6-7 mm long, fruiting pedicels somewhat recurved; pod slightly stipitate, globose, 4 mm thick, sparingly stellate; style slightly shorter. Sandy soil: Tex.—Calif.—Utah. *Son.* Mr—My.

19. *L. Engelmannii* (A. Gray) S. Wats. Cespitose perennial; stems erect, 3-5 dm high, petals often 1 cm. long; fruiting pedicels ascending or the lower spreading; pod 6-8 mm. thick; style about 8 mm. long. Rocky hills and plains: Tex.—N.M.—Colo. *Son.* Ap—My.

20. *L. stenophylla* (A. Gray) S. Wats. Stems many, very leafy; petals about 8 mm long; fruiting pedicels ascending, 1-1.5 cm. long; pod 4-5 mm. thick; style of about the same length. *L. Fendleri* Coulter & Nels., not S. Wats. Dry plains and hills: Tex.—Ariz.—Colo.; n Mex. *Son.* My—Je.

21. *L. ovalifolia* Rydb. Stems erect, 1-2 dm. high; basal leaves petioled, 1-2 cm long; stem-leaves sessile, linear-oblanceolate; inflorescence corymbiform, petals 8-10 mm. long, obovate; fruiting pedicels ascending; pods 5-6 mm. thick, style of about the same length. *L. ovata* Greene. *L. Engelmannii* Coult. & Nels., not S. Wats. Dry plains and hills: Neb.—Kans.—N.M.—Colo. *Plain—Son.* My—Je.

11. SUBULARIA L.

Small aquatic perennials, scapose and with subulate basal leaves. Flowers perfect, racemose. Sepals ovate, equal, spreading. Petals oblong or spatulate, without claws, white. Stamens 6, scarcely unequal; anthers oval. Pod short, subglobose or pear-shaped, turgid. Seeds few. Embryo folded above the radicle.

1. *S. aquatica* L. Submerged perennial; leaves 10-20, erect or nearly so, 2-7 cm. long, subulate; scape 2-10 cm. long; submerged flowers cleistogamous; fruit obovate. Ponds: Newf.—N.H.—Calif.—B.C. Mont.

12. CAMELINA Crantz. FALSE FLAX.

Annual caulescent herbs, glabrous or with branching hairs. Leaves alternate, entire or toothed, often clasping. Flowers perfect, in elongate racemes. Sepals equal. Petals yellowish or greenish. Pod short, inflated, nearly terete, obovoid; valves 1-nerved; style slender; stigma capitate. Seeds in two rows, usually few, marginless. Cotyledons incumbent.

Stem glabrous.
Stem pubescent.

1. *C. sativa*.

2. *C. microcarpa*.

1. *C. sativa* (L.) Crantz. Stem 3-6 dm. high, branched above; lower leaves petioled, 5-8 cm. long, lanceolate; upper stem-leaves sagittate at the base and clasping; petals light yellow, 5-6 mm. long; pod pear-shaped 6-8 mm. long. Waste places: N.S.—N.Y.—Calif.—Mont.; adv. from Eu. Plain—Submont. Je—Jl.

2. *C. microcarpa* Andr. Stem 3-6 dm. high; lower leaves lanceolate, more or less hirsute; stem-leaves sagittate at the clasping base; petals about 4 mm. long; pod 4-6 mm. long, pear-shaped, strongly margined. Waste places: R.I.—Va.—Ariz.—B.C.; nat. from Eu. Plain—Submont. My—Jl.

13. NÉSILIA Desv.

Leafy-stemmed annuals. Flowers perfect. Sepals short, equal at the base. Petals spatulate, clawed. Stamens 6, free and unappendaged. Fruit globose, indehiscent, usually 1-celled by obliteration of the partition; style elongate; stigma simple. Seeds 1 or 2, neither winged nor margined. Cotyledons incumbent.

1. *N. paniculata* (L.) Desv. Slender branched annual; stems 3-6 dm. high, rough-hispid; leaves lanceolate, sagittate at the base, 2-6 cm. long; racemes elongate in fruit; petals bright yellow, 2 mm. long; pod subglobose, reticulate and mucronate, about 2 mm. thick. Waste places: Que.—S.D.—B.C.; adv. from Eu. Plain—Submont. Jl—Au.

14. ARMORACIA Gaertn. HORSE-RADISH.

Tall glabrous perennials, with thick pungent taproot and leafy stem. Leaves crenate or sinuately lobed. Flowers perfect, in dense racemes or panicles. Petals white, clawed. Stamens 6, free and unappendaged. Pod short, round-ellipsoid or subglobose; style short; stigma subcapitate.

1. *A. Armoracia* (L.) Cockerell. Stem 6-10 dm. high; basal leaves 1.5-3 dm. long, glabrous, oblong; stem-leaves lanceolate, serrate or crenate; flowers 4-8 mm. wide, showy. *Nasturtium Armoracia* Fries. Around dwellings: Que.—Fla.—Tex.—Mont.; escaped from cultivation. Jl—S.

15. RADÍCULA Hill. YELLOW WATER-CRESS, MARSH-CRESS.

Annual or perennial herbs, of wet situations. Leaves alternate, pinnately dissected or lobed. Flowers perfect, in terminal or axillary racemes. Sepals spreading during anthesis. Petals yellow, or rarely white or wanting, clawed. Stamens 2-6. Pods terete, from subglobose to short-cylindric; valves usually 1-nerved. Seeds in 2 rows, turgid. Cotyledons accumbent. [*Nasturtium* R. Br., in part. *Roripa* Scop.]

Perennials with rootstocks; petals much exceeding the sepals.

Pods papillose.

Pods ovate, leaves coarsely toothed.

Pods lance-oblong or linear, mostly curved; leaves pinnatifid.

Leaves thin, petals white, fruit recurved.

Leaves thick; petals yellow, fruit erect.

Pods not papillose.

1. *R. calycina*.

2. *R. trachycarpa*.

3. *R. Columbiæ*.

4. *R. sinuata*.

Annuals or biennials.

Pods thickened towards the apex and truncate, curved, longer than the pedicels.

5. *R. clavata*.

Pods not thickened towards the apex, acute or obtuse.

Pods spherical to oblong-ellipsoid, in the latter case shorter than the pedicels.

Pedicels 4-10 mm long

Pods 5-8 mm long, 2-3 mm. thick; stem sparingly hirsute.

6. *R. pacifica*.

Pods 3-5 mm long (rarely 6-7 mm in *R. palustris*), 1.5-2 mm thick.

Stem more or less hirsute.

7. *R. hispida*.

Stem glabrous

Stem tall, 3-8 dm high, stigma prominent, 2-lobed

8. *R. terrestris*

Stem low, divaricately branched, 1-3 dm. high; stigma scarcely

thicker than the style.

9. *R. alpina*.

Pedicels 2-5 mm long, pod globose

10. *R. sphaerocarpa*.

Pods oblong to linear-cylindrical, equalling or longer than the short pedicels.

Style about 1 mm long.

Leaves nearly all pinnatifid, with obtuse divisions.

11. *R. obtusa*.

Leaves mostly sinuate, or if pinnatifid, with acute divisions

Pods short-ellipsoid, straight on straight pedicels.

10. *R. sphaerocarpa*.

Pods elongate-ovoid, curved, on curved pedicels.

12. *R. curvipes*.

Style minute, 0.5 mm long or less

Pods 1.5 mm thick or less, distinctly pedicelled; seeds tuberculate.

Petals about 2 mm long or more, pods linear, 1 mm. or less thick,

strongly curved.

Leaves divided to near the midrib, their segments obtuse.

13. *R. curvifolia*.

Leaves merely cleft, with acute segments.

14. *R. Nuttallii*

Petals rarely more than 1 mm long; pods usually slightly tapering

upwards, about 1.5 mm. thick, straight or slightly curved

Leaves pinnatifid.

15. *R. lyrata*.

Low, slender, less than 2 dm. high, leaves not auricled at the base.

Taller and stouter, over 2 dm high, petioles of the stem-leaves

auricled at the base.

16. *R. Underwoodii*.

Leaves entire or merely sinuate

17. *R. integra*.

Pods fully 2 mm. thick, almost sessile; seeds pitted.

18. *R. sessiliflora*

1. *R. calycina* (Engelm.) Greene. Stem hirsute, erect, 2-3 dm. high; leaves oblong or oblanceolate, sessile and even subclasping, coarsely toothed; racemes rather dense; pedicels ascending, 5-8 mm. long; petals light yellow, slightly exceeding the sepals; pod erect, ovate, 3-5 mm. long; style more than half as long. *Nasturtium calycinum* Engelm. Sandy bottoms: Mont. *Plan.* Jl.

2. *R. trachycarpa* (A. Gray) Rydb. Stem branching, papillose-puberulent or glabrous; leaves lyrate-pinnatifid, with many oblong divisions, nearly glabrous, petals white, 5 mm long; pedicels spreading; pod oblong-linear, curved, ascending. *N. trachycarpum* A. Gray. Wet places: s Colo. *Plan*—*Submont.* Je.

3. *R. Columbiæ* (Suksd.) Greene. Stem branched, 1-3 dm. high, papillose or glabrate; leaves pinnatifid, with many oblong often toothed divisions; petals yellow, spatulate, 4 mm. long; pedicels ascending or spreading; pod ascending or erect, curved, 5-8 mm. long; style nearly 2 mm. long. *Roripa calycina* Rydb, not *Nasturtium calycinum* Engelm. River banks and wet sandy places: Mont.—Neb.—N.M.—Wash. *Plan*—*Submont.* Je—Jl.

4. *R. sinuata* (Nutt.) Greene. Stems 1-4 dm. high, glabrous or nearly so; leaves glabrous, pinnately divided or cleft, with numerous oblong or lanceolate, often toothed divisions; petals yellow, 4-5 mm. long; pod curved upwards, glabrous, 1-1.5 cm. long, 2 mm. thick; style 3 mm. long. *N. sinuatum* Nutt. River valleys: Sask.—Minn.—Ill.—Tex.—Ariz.—Wash.; Ont. *Plan.* Ap—Au.

5. *R. clavata* (Rydb.) J. M. Macoun. Biennial, perfectly glabrous; stem 6-10 dm. high, simple up to the inflorescence; leaves lyrate-pinnatifid, 5-10 cm. long, more or less auricled at the base; lobes oblong to ovate, broadly dentate; pedicels in fruit 5-10 mm. long, divaricate; petals spatulate, about 3 mm. long; pod 10-12 mm. long, 2.5-3 mm. thick; style nearly 1 mm. long. *Roripa clavata* Rydb. River valleys: Ida.—Ore.—Alaska. *Submont.* Ap—S.

6. *R. pacifica* (Howell) Greene. Annual or biennial; stem 3-10 dm. high, glabrous, or slightly hairy, branching above; leaves lyrate pinnatifid or pinnately lobed, with oblong-lanceolate or triangular, toothed divisions; petals

yellow, about, 2.5 mm. long, spatulate; pedicels in fruit spreading; pod 7-10 mm. long, 2 mm. thick; style 0.5-0.75 mm. long. *Roripa pacifica* Howell. Wet places: Alaska—Wash.—Utah—Alta. *Submont.* My—Au.

7. *R. hispida* (DC.) Heller. Biennial; stem stout, branched above, 3-12 dm. high; leaves lyrate-pinnatifid, with lanceolate or ovate, toothed divisions; petals spatulate, yellow, 2 mm. long; fruiting pedicels ascending or spreading, pod 4-6 mm. long, 2 mm. thick, glabrous; style about 1 mm. long. *N. hispidum* DC. Water and wet places: N.B.—Fla.—N.M.—Wash.—Utah—Alaska. *Plain—Submont.* Je—Au.

8. *R. terrestris* (R. Br.) Woot. & Standl. Annual or biennial; stem branched above, 3-10 dm. high; leaves lyrate-pinnatifid, with oblong or lanceolate, toothed divisions; petals yellow, spatulate, 2 mm. long; fruiting pedicels usually spreading; pod 5-7 mm. long, 2 mm. thick; style 1 mm. long. *Sisymbrium amphibia* palustre L. *N. terrestris* R. Br. *N. palustre* DC. *Radicala palustris* (L.) Moench. Water and wet places: Lab.—Ga.—N.M.—Alaska; Eurasia, Mex. *Plain—Submont.* Ap—O.

9. *R. alpina* (S. Wats.) Greene. Biennial; stem branched below, 1-3 dm. high; leaves sinuately lobed, rarely pinnatifid, elliptic or oblanceolate, obtuse, petals spatulate, 2.5 mm. long; pedicels spreading, pod about 5 mm. long, 2 mm. thick; beak about 0.5 mm. long. *N. obtusum alpinum* S. Wats. Wet places in the mountains: Mont.—Colo.—Utah—Ida. *Submont.—Subalp.* Jl—Au.

10. *R. sphaerocarpa* (A. Gray) Greene. Annual or biennial; stem diffusely branched from the base, 1-3 dm. high, glabrous; leaves sinuately or lyrate-ly lobed, with rounded lobes; petals yellow, 1.5 mm. long; pedicels 2-3, rarely 5 mm. long; pod 2-3 mm. long, nearly 2 mm. thick; style about 0.5 mm. long. *N. sphaerocarpum* A. Gray. Along streams: Ill.—Tex.—Calif.—Wyo. *Plain—Submont.* Jl—S.

11. *R. obtusa* (Nutt.) Greene. Annual; stem diffusely branched at the base, 1-3 dm. high, glabrous; leaves pinnatifid, with obovate or rounded, sinuately toothed divisions; petals narrowly spatulate, 1 mm. long; pedicels ascending or spreading; pod 4-8 mm. long, 1-2 mm. thick; style about 1 mm. long. *N. obtusum* Nutt. Wet places: Mich.—Mo.—Tex.—Utah—Wash. *Plain—Submont.* Je—S.

12. *R. curvipes* Greene. Annual; stems 1-3 dm. high, diffusely branched, leaves lyrate-pinnatifid or lobed, usually with acute divisions; petals about 1 mm. long; pedicels spreading or recurved; pod about 5 mm. long, somewhat curved, about 2 mm. thick, acute at the apex. *Roripa curvipes* Greene. Wet places in the mountains: Utah—Wyo.—N.M. *Submont.—Subalp.* Jl—S.

13. *R. curvisiliqua* (Hook.) Greene. Annual or biennial; stem diffusely branched, 1-3 dm. high, glabrous; leaves pinnately divided, with many oblong, mostly obtuse divisions, glabrous; petals yellow, 2.5 mm. long, oblanceolate, pedicels 4-5 mm. long; pod curved, 8-12 mm. long, about 1 mm. thick. *Sisymbrium curvisiliquum* Hook. *N. curvisiliquum* Nutt., in part. Wet places: Mont.—Wyo.—Ore.—Wash. My—S.

14. *R. Nuttallii* (S. Wats.) Greene. Biennial; stems solitary or several, erect, rather simple, 3-4 dm. high, glabrous; leaves pinnately lobed or toothed, with lanceolate or triangular lobes or teeth, or the lower ones with linear divisions; petals 2-2.5 mm. long, oblanceolate; pedicels 2-4 mm. long; pod 8-15 mm. long, 1 mm. thick, somewhat curved. *N. curvisiliqua Nuttallii* S. Wats. *N. Nuttallii* Rydb. Wet places: Wash.—Calif.—(? Mont.)

15. *R. lyrata* (Nutt.) Greene. Annual; stems diffusely branched, 1-3 dm. high, glabrous; leaves pinnately divided, with oblong to ovate, coarsely toothed divisions; petals scarcely 1 mm. long; pedicels 1-3 mm. long, ascending; pod 6-15 mm. long, 1-1.5 mm. thick. *N. lyratum* Nutt. Wet places: Mont.—Colo.—Calif.—Wash. *Plain—Submont.* Jl—Au.

16. *R. Underwoodii* (Rydb.) Heller. Biennial; stem 2 dm. or more high, divaricately branched, perfectly glabrous; leaves 3-5 cm. long, lyrate-pinnatifid, thin; lobes oblong, obtuse, the terminal one elliptic to broadly oval, sinu-

ately toothed; pedicels short, in fruit scarcely more than 4 mm. long, diverging or reflexed; petals light yellow, not quite 1 mm. long; fruit 5-6 mm. long, slightly thicker at the base; style not 0.5 mm. long. Wet places, in the mountains: Colo *Subalp.* S.

17. *R. integra* (Rydb.) Heller. Biennial, glabrous; stems few, strict, branched above; stem-leaves spatulate or rhombic-spatulate, 1-2 cm. long, not auricled at the base; petals 1.5 mm. long, scarcely exceeding the sepals; pedicels 1-3 mm. long, ascending; pod about 8 mm. long, somewhat curved; style about 0.5 mm. long. *Roripa integra* Rydb. Wet places, in the mountains: Utah. *Mont.* Au

18. *R. sessiliflora* (Nutt.) Greene. Annual or biennial; stem usually erect, branched, glabrous; leaves lobed or cleft, with rounded lobes, or merely coarsely crenate, petals 1.5-2 mm. long; pedicels 1-2 mm., or sometimes almost none; pod 6-12 mm. long, fully 2 mm. thick; beak short and thick. *Nasturtium sessiliflorum* Nutt. Wet places: Ill.—Fla.—Tex.—Neb. *Plain.* Ap-S.

16. SISÝMBRIUM (Tourn.) L. WATER-CRESS.

Aquatic perennials, with floating or creeping stems, rooting at the nodes. Leaves odd-pinnate. Flowers perfect, in racemes. Sepals equal at the base, spreading during anthesis. Petals white, without nectaries. Pods cylindric; valves 1-nerved. Styles slender; stigma 2-lobed. Seeds in 2 rows, turgid. Cotyledons accumbent.

1. *S. Nasturtium-aquaticum* L. Aquatic perennial; leaves pinnate, with 1-11 orbicular to oblong-lanceolate sinuate leaflets; sepals oblong, about 2 mm. long, petals white, spatulate, about 4 mm. long; fruiting pedicels divaricate; pod 1-2 cm. long, 3 mm. thick, somewhat curved; beak about 1 mm. long. In water and mud: N.S.—Va.—Calif.—B.C.; Mex., W. Ind., S. Am.; nat. from Eu *Plain—Subalp.* My-S.

17. TURRITIS L. TOWER MUSTARD.

Caulscent herbs, with partly clasping, auricled stem-leaves. Flowers in elongate racemes. Sepals erect, two of them slightly saccate at the base. Petals yellowish white, small. Pods erect, linear-cylindric, terete or slightly flattened, 1-nerved and veined; stigma cupulate. Seeds flattened, partially incumbent, i. e., radicle oblique.

1. *T. glabra* L. Biennial; stem erect, 6-15 dm. high, hirsute below; basal leaves oblanceolate, sinuately toothed or somewhat lyrate, hirsute-stellate, 5-15 cm. long; stem-leaves glabrous, lanceolate, sagittately clasping, 2-10 cm. long; sepals and petals greenish white, 3 mm. long, pedicels erect, 4-12 mm. long; pod erect, 4-10 cm. long, 1.5-2 mm. wide. *Arabis perfoliata* Lam. *A. glabra* (L.) Bernh. Waste places: Que.—Pa.—Calif.—B.C.; nat. from Eu. *Plain—Submont.* Ap-Au.

18. ERÝSIMUM L. HEDGE MUSTARD.

Annual caulescent herbs. Leaves alternate, pinnately lobed. Flowers perfect, in racemes. Sepals subequal, ascending. Petals small, pale yellow. Filaments unappendaged. Pod subulate, tapering from the base to the apex. Style almost none; stigma 2-lobed. Cotyledons incumbent. Seeds in one row, marginless.

1. *E. officinale* L. Annual; stem branching, hirsute, at least below; leaves hirsute, pinnatifid or the uppermost merely hastate; terminal lobes of the lower leaves rounded and toothed, those of the upper lanceolate; petals pale yellow, spatulate, 3 mm. long; pods erect, on very short pedicels, 1.5-2 cm. long, glabrous or pubescent. *Sisymbrium officinale* Scop. Waste places: N.S.—Fla.—Calif.—B.C.; nat. from Eu. *Plain—Submont.* My-S.

19. NÓRTA Adans. TUMBLE MUSTARD.

Caulscent leafy annuals, with runcinately pinnatifid or toothed leaves, pubescent with simple hairs. Flowers perfect, in elongate racemes. Sepals

subequal, ascending. Petals light yellow, clawed. Stamens 6; filaments unappendaged. Pod elongate, narrowly cylindric, terete; style none; stigma slightly 2-lobed. Seeds in one row, numerous, marginless. Cotyledons incumbent. [*Sisymbrium* L., in part.]

18. *N. altissima* (L.) Britton. Tall annual; stem freely branching, 6-12 dm. high, sparingly ciliate; leaves pinnatifid, the lower with oblong or lanceolate, the upper with narrowly linear divisions; sepals oblong, 5 mm. long; petals yellowish white, spatulate, 6-8 mm. long; pedicels and pods ascending-spreading, the latter, 7-10 cm. long, 1 mm. thick, sessile. *Sisymbrium altissimum* L. Waste places: Que.—D.C.—N.M.—Calif.—B.C.; nat. from Eu. *Plann.* My-Au.

20. *BRAÏA* Sternb. & Hoppe.

Perennials, with a stout root, caespitose at the base. Flowers perfect, racemose. Sepals short, ovate, equal at the base. Petals obovate, clawed. Fruit oblong, flattish; valves faintly 1-nerved, style short; stigma more or less 2-lobed; partition with transversely elongated reticulations. Cotyledons incumbent

1. *B. purpurascens* (R. Br.) Bunge. Perennial, with a taproot; leaves fleshy, spatulate or oblanceolate, glabrous, or ciliate towards the base, 1-2 cm. long; stems several, scapiform, 1 dm. high or less, more or less pubescent; sepals purplish, 2 mm. long; petals white or pinkish, broadly spatulate; pods oblong, 8-10 mm. long, sparingly hairy. Alpine-arctic stations: Greenl.—Lab.—Alta.—Alaska; Spitzbergen. *Alp.* Jl-Au.

21. *SÓPHIA* Adans. TANSY MUSTARD.

Annual or biennial (all ours), or perennial herbs, or rarely suffruticose, pubescent with short branched hairs. Leaves usually twice pinnatifid to finely dissected, or in one of our species merely pinnately lobed or toothed. Flowers in elongate racemes. Sepals narrow, subequal, ascending, early deciduous. Petals yellow or yellowish white, rarely pure white. Pod linear or club-shaped; style short; stigmas minute, entire; valves one-nerved. Seeds in 1 or 2 rows in each cell. Cotyledons incumbent.

Leaves all pinnately dissected; pod not twisted.

Pedicels ascending or spreading.

Pods linear, 1 mm. wide, somewhat curved; seeds uniserial

Stem simple or with erect-ascending branches, pods 8-25 mm. long.

Pods 15-25 mm. long, leaves mostly thrice pinnatifid

Inflorescence elongate, pods nearly erect, pedicels about 1 cm. long

1 *S. Sophia*
2. *S. sophioides*

Pods 8-15 mm. long, leaves once or twice pinnatifid

Stem glabrous, or sparingly stellate or glandular puberulent

Leaf-segments all narrow, linear or oblong, or those of the lower leaves broad and obtuse, more or less grayish stellate

Stem grayish stellate, not at all glandular, leaf-segments all narrow.

3 *S. gracilis*
Stem very sparingly stellate, often glandular-puberulent, segments of the lower leaves broad, very obtuse

4. *S. californica*

Leaf-segments all broad, lanceolate or ovate, thin and bright green
Pods divergent, primary segments of the uppermost leaves often entire

5 *S. leptophylla*
Pods ascending; primary segments of the leaves all sharply cut-lobed.

6. *S. incisa*

Stem densely glandular-pubescent.

7. *S. viscosa*
Stem diffusely branched, pods 5-8 mm. long.

8 *S. purpurascens*
Pods more or less clavate, 5-12 mm. long, 1-2 mm. wide, seeds usually more or less biserial.

Pods 8-12 mm. long, mostly erect on spreading pedicels.

Leaves and stem green, only sparingly stellate

Stem divaricately branched; branches making with the stem an angle

of 45 degrees or more, pedicels 7-10 mm. long, usually shorter

than the pod.

9 *S. ramosa*
Stem simple or with almost erect or strongly ascending branches.

Petals much exceeding the sepals

Terminal segments of the upper leaves usually elongate, linear,

entire, segments all narrow.

10. *S. filipes.*

- Terminal segments not greatly elongate; segments of the lower leaves obovate. 11. *S. magna*.
 Petals not much exceeding the sepals, segments narrow; terminal segments of the upper leaves not elongate. 12. *S. intermedia*.
 Leaves and stem cinereous-stellate
 Petals longer than the sepals, about 2 mm. long; upper leaves mostly once pinnate, with elongate, broad terminal segments. 13. *S. andrenarum*.
 Petals not longer than the sepals, about 1.5 mm. long; upper leaves usually more dissected, terminal segment narrow, not elongate. 14. *S. halictorum*.
 Pods 5-8 mm. long
 Pods acute above, acuminate below; style obsolete. 15. *S. pinnata*.
 Pods ascending or spreading. 16. *S. Nelsonii*.
 Pods erect, leaves sparingly stellate 17. *S. leptostylis*.
 Pods acuminate at both ends, style evident.
 Pedicels erect
 Pods over 1 mm. thick. 18. *S. procera*.
 Plant green and almost glabrous. 19. *S. Hartwegiana*.
 Plant cinereous-pubescent. 20. *S. glandulifera*.
 Pods about 0.75 mm. thick, plant glandular-puberulent, especially the inflorescence, or glabrous 21. *S. perplexa*.
 Lower leaves merely coarsely toothed or lobed; pod twisted.

1. *S. Sophia* (L.) Britton. Stem much branched, 3-10 dm. high, minutely pubescent; leaves thrice pinnate, with narrowly linear divisions; petals cream-colored, pod erect, somewhat curved, glabrous, about 2 cm. long, less than 1 mm. thick, torulose. *Sisymbrium Sophia* L. Waste places: N.B.—N.Y.—Utah—Orc.—Wash.; nat. from Eu. Je—Jl.

2. *S. sophioides* (Fisch.) Heller. Stem 3-5 dm. high, slightly viscid-puberulent, leaves thrice pinnate, with linear or oblong divisions, nearly glabrous; petals spatulate, cream-colored; pod 2-2.5 cm. long, 1 mm. thick, filiform. *Sisymbrium sophioides* Fisch. Subarctic regions: Hudson Bay—Man.—B.C.—Alaska. Subalp. Jl.

3. *S. gracilis* Rydb. Stem slender, 1-3 dm. high, finely stellate, somewhat branched, leaves 1-5 cm. long, once or twice pinnatifid, with linear or oblong lobes, petals 2-2.5 mm. long, light yellow; pedicels ascending; pods 1-1.5 long, 1 mm. thick, more or less curved. Hills and meadows: Wyo.—Wash.—Mack. Submont. My—Jl.

4. *S. californica* (T. & G.) Rydb. Stem 3-4 dm. high; leaves twice pinnate, the lower with oblong obtuse divisions, the upper with linear ones; petals light yellow, 3-4 mm. long; pedicels ascending; pod filiform, 1-1.5 mm. (rarely 2 mm.) long, 1 mm. thick, erect. *Sisymbrium canescens* T. & G. Waste places: Calif.—B.C.—Mont. Son.—Submont. Ap—Je.

5. *S. leptophylla* Rydb. Stems 5-7 dm. high, sparingly glandular; leaves very thin, only once pinnate; segments of the lowest leaves rounded, those of the middle lanceolate and somewhat incised, those of the upper entire; petals bright yellow, about 1.5 mm. long; pod linear, 8-10 mm. long, much less than 1 mm. thick, torulose, spreading, arcuate, curved up. Foot-hills: Colo.—Mont. Submont.—Mont. Jl—Au.

6. *S. incisa* (Engelm.) Greene. Stem 3-10 dm. high, usually branched, slightly stellate or glabrate; leaves thin, pinnate or the lower twice pinnate; segments lanceolate, deeply toothed, acute; petals bright yellow, 3 mm. long; pedicels usually spreading; pod filiform, 1-1.5 cm. long, scarcely 1 mm. thick, somewhat curved. *Sisymbrium incisum* Engelm. Hills and cañons: N.M.—Wyo.—Utah. Submont.—Mont. My—Jl.

7. *S. viscosa* Rydb. Stem 5-10 dm. high, at least the upper part decidedly glandular or viscid-villous; leaves 3-10 cm. long, twice pinnatifid, densely pubescent, primary divisions of the lower leaves ovate and obtuse, those of the upper lanceolate and acute; secondary divisions oblong, acute or obtuse; petals bright yellow, spatulate, 2-3 mm. long; pod over 1 cm. long and less than 1 mm. thick. Cañons and grassy slopes: Wyo.—Nev.—B.C. Son. Je—Au.

8. *S. purpurascens* Rydb. Stem very slender, diffusely branched above, glabrous and purplish; upper leaves simply pinnate, with linear-oblong divisions, slightly stellate; pedicels ascending in fruit, 4-5 mm. long; fruit very slender,

5-8 mm. long, 0.75 mm. thick, linear, nearly cylindrical, tapering somewhat at both ends, slightly torulose. Mountains: Colo. *Submont.* S.

9. *S. ramosa* Rydb. Stems 3-6 dm. high, finely but sparingly stellate; leaves once or twice pinnate; divisions linear or linear-oblong; petals oblanceolate, pale yellow, slightly longer than the sepals; pod somewhat clavate, 8-10 mm. long, erect or strongly ascending, about 1 mm. thick. Mountains. Colo. *Mont* S.

10. *S. filipes* (A. Gray) Heller. Stem branched, 3-6 dm. high, almost glabrous; leaves once to twice pinnatifid, sparingly stellate or glabrous; segments linear or oblong, often lobed; petals bright yellow, 3 mm. long or more; pedicels 1-2 cm. long; pods clavate, erect, 12-15 mm. long, 1.5-2 mm. thick. Mountains, cañons, and plains: Sask.—N.D.—Colo.—Utah—Wash.—B.C. *Submont.* Ap-Jl.

11. *S. magna* Rydb. Stem branched, 5-10 dm. high, sparingly stellate-puberulent or glabrous, stout; basal leaves twice to thrice pinnatifid, 1-2 dm. long, nearly glabrous; segments obovate, often toothed; petals spatulate, nearly 3 mm. long, rather light yellow; pod glabrous, more or less clavate, 12-15 mm. long, 1.5-2 mm. thick. River bluffs: Colo. *Mont.*

12. *S. intermedia* Rydb. Stem 3-7 dm. high, often glandular above; leaves twice or thrice pinnatifid; segments linear or linear-oblong; petals spatulate, slightly if at all exceeding the sepals; pedicels in fruit 1-1.5 cm. long, usually spreading; pods clavate, glabrous, 8-12 mm. long, 1.5 mm. thick, nearly erect. Prairies, plains, and waste places: Mich.—Tenn.—Colo.—Calif.—B.C. *Plain—Mont.* My-Jl.

13. *S. andreanum* Cockerell. Stem 3-7 dm. high; lower leaves twice pinnatifid, with small oblong or ovate divisions, the upper more simple and with linear elongated divisions; petals spatulate; pod ascending or erect, clavate, about 1 cm. long, 1.5 mm. thick. Dry ground: Mont.—N.M.—Ariz.—Wash *Plain—Mont.* My-Jl.

14. *S. halictorum* Cockerell. Stem branching, 3-5 dm. high; leaves twice pinnate, with short linear or oblong divisions; pedicels 5-10 mm. long; pods clavate, nearly 1 cm. long, erect or nearly so. Dry regions: Tex.—Colo.—Utah—Ariz. *Son.—Submont.* Ja-Jc.

15. *S. pinnata* (Walt.) Howell. Stem 3-6 dm. high; leaves thrice or twice pinnatifid into short, obovate, oval, or elliptic divisions; petals pale yellow, pedicels spreading, 7-12 mm. long; pod clavate, 5-8 mm. long. *Sisymbrium canescens* Nutt. Sandy or dry soil: Va.—Fla.—Ariz.—Colo. *Plain.* Mr-Je

16. *S. Nelsonii* Rydb. Stems 2-4 dm. high; leaves pinnatifid or bipinnatifid, with linear or oblong divisions; petals light yellow, spatulate, 1.5 mm. long, fruiting pedicels ascending, 4-6 mm. long; pods clavate, 5-8 mm. long, glabrous, slightly over 1 mm. thick. Gravelly flats, sandy plains, &c.: Wyo.—Utah *Plain—Submont.*

17. *S. leptostylis* Rydb. Stem 3-6 dm. high, rather simple below, sparingly stellate or glabrous; leaves 3-10 cm. long, twice pinnatifid into oblong divisions; petals spatulate, slightly surpassing the sepals; pedicels in fruit 5-8 mm. long; pod about 5 mm. long, tapering at both ends; style 0.5-0.7 mm. long. Mountain valleys: Utah. *Mont.* Je-Au.

18. *S. procera* Greene. Stem 5-20 dm. high, simple below; leaves twice pinnatifid, with lanceolate, toothed segments, or the lower ones with obovate segments; petals spatulate, about 2 mm. long; pedicels 5-8 mm. long; pods 6-10 mm. long, over 1 mm. thick, tapering at both ends; style nearly 0.5 mm. long. Sandy valleys and hills: Colo.—Utah—Wyo. *Submont.—Mont.* Jl-S.

19. *S. Hartwegiana* (Fourn.) Greene. Stem 6-20 dm. high; leaves twice pinnatifid, with lanceolate divisions; petals spatulate, light yellow, 2.5-3 mm. long; pedicels 5-8 mm. long; pod linear, 10-15 mm. long, 1 mm. thick. *S. brevipes* (Nutt.) Rydb. River banks, waste grounds, and sandy valleys: Sask.—Minn.—Colo.—Utah—B.C. *Plain—Submont.* Jl-Au.

20. *S. glandulifera* Rydb. Stem simple below, about 6 dm. high; branches spreading, with upwardly curved ends; leaves pubescent and viscid, bipinnately divided, segments linear-lanceolate, or those of the upper leaves filiform; petals scarcely exceeding the sepals; pedicels in fruit 4-6 mm. long; pods 8-10 mm. long, erect, more or less curved, scarcely exceeding 0.7 mm. in width; style slender, short, about 0.5 mm. long. Rolling plains: Wyo—Colo. *Plain*—*Submont.* Je—Jl.

21. *S. perplexa* (Henders.) Rydb. Stem 1.5-4 dm. high, with ascending branches, stellate-pubescent; basal leaves 1-3 cm. long, petioled; blades spatulate or oblanceolate, repand-dentate or coarsely lobed; cauline oblanceolate, sessile, petals white, 3 mm. long; pedicels 5-8 mm. long, spreading; pod linear, torulose, about 1 cm. long, usually twisted. *Sisymbrium perplexum* Henders. Slopes: Ida. *Submont.* Jl.

22. MALCÓLMIA R. Br.

Leafy-stemmed annuals, with branched hairs. Flowers perfect, racemose or (in ours) spicate. Sepals erect, usually saccate at the base. Petals white or rose-colored. Longer stamens coherent. Fruit cylindric, dehiscent, with 1 or 2 rows of seeds.

1. *M. africana* (Willd.) R. Br. Annual; stem 2-4 dm. high, with ascending-spreading branches; leaves oblanceolate or lanceolate, 4-8 cm. long, usually sinuate-dentate, hirsute with branched hairs, flowers sessile; sepals linear, 3 mm. long; petals pinkish, veined, long-clawed; pods ascending, 5-6 cm. long, 1-1.5 mm. thick. Sandy or alkaline ground: Utah; adv. from n Africa. Je—Jl.

23. CONRÍNGIA (Heist.) Link. HARE'S-EAR.

Glabrous annuals, with sessile clasping leaves. Flowers perfect, in elongate racemes. Sepals subequal, long and narrow, ascending. Petals light yellow. Pod elongate-linear, more or less 4-angled; style short; stigma simple or nearly so. Seeds in a single row in each cell, oblong, thick, not margined. Cotyledons incumbent.

1. *C. orientalis* (L.) Dum. Glabrous annual; stem 3-6 dm. high; leaves oval or elliptic, deeply cordate-clasping, 4-10 cm. long; petals oblanceolate, yellowish white, 8 mm. long; pod ascending, 8-10 cm. long, fully 2 mm. thick; beak 1.5 mm. long. Waste places and along roads: N S.—Del.—Colo.—Utah—Ore.—B.C.; adv. from Eu. *Plain.* My—Jl.

24. ARABIDÓPSIS (DC.) Schur. MOUSE-EAR CRESS.

Annual or perennial herbs, with branched hairs. Leaves entire or toothed. Flowers perfect, small, in terminal racemes. Sepals equal, not saccate at the base. Petals white. Style very short; stigma 2-lobed. Pod narrow, linear, with rounded, nerveless or finely nerved valves. Seeds in 1 row in each cell. Cotyledons incumbent. [*Pilosella* (Thal) Kostel. *Stenophragma* Celak.]

Stem-leaves not auriculate-clasping or sagittate at the base.

Annual

Perennial.

Stem-leaves auriculate-clasping or sagittate at the base.

Pubescent biennials or perennials.

Pod 2 mm. thick, style obsolete.

Pod 1 mm. thick, style 0.5 mm. long.

Glabrous annual.

1. *A. Thaliana*.

2. *A. Richardsonii*.

3. *A. virgata*.

4. *A. stenocarpa*.

5. *A. glauca*.

1. *A. Thaliana* (L.) Schur. Stem simple or branched, 2-4 dm. high, sparingly pubescent, basal leaves oblanceolate or spatulate, usually petioled, 2-5 cm. long, sparingly hirsute-stellate, petals white, oblanceolate, 3-4 mm. long; pods ascending, glabrous, 1-1.5 cm. long, 0.75 mm. wide; style very short. *Arabis Thaliana* L. *Sisymbrium Thalianum* A. Gray. *Stenophragma Thalianum* Celak. Waste places: Mass—Ga.—Kans.; Utah; nat. from Eu. *Plain*—*Son.* Ap—Je.

2. *A. Richardsonii* Rydb. Stem branched and decumbent at the base, 1-2 dm. high; basal leaves spatulate, thick, 1-3 cm. long, stellate, often

coarsely toothed; petals clawed, spatulate, 4 mm. long; pods erect, stellate, 2-3 cm. long, about 1 mm. wide, torulose; style about 0.5 mm. long. *Sisymbrium humile* Hook., not Meyer. *Pilosella Richardsonii* Rydb. Sandy plains: Mack.—Alta.—(? Ore.)—B.C.—Alaska. *Boreal*—Mont. Je-Jl.

3. *A. virgata* (Nutt.) Rydb. Stem 2-4 dm. high, simple or branched; hirsute with branched hairs; basal leaves 2-5 cm. long, oblanceolate, spatulate, or oblong, stellate and somewhat hirsute; petals about 4 mm. long, spatulate; pod erect, 2-3 cm. long, nearly 2 mm. wide, style obsolete. *Sisymbrium virgatum* Nutt. *Arabis Brebneriana* A. Nels. Plains and hills: Wyo.—Colo. *Plain*—*Submont.* Je.

4. *A. stenocarpa* Rydb. Stem hirsute with branched hairs; basal leaves oblanceolate, 2-3 cm. long, sinuate-dentate, short-petioled, hirsute-stellate; petals spatulate, 3 mm. long; pod 2.5-4 cm. long, glabrous, scarcely 1 mm. wide. *Pilosella stenocarpa* Rydb. Dry plains: Sask.—Colo.—Wyo. *Plain.* Je-Jl

5. *A. glauca* (Nutt.) Rydb. Stem 2-3 dm. high, glabrous; basal leaves spatulate, entire; stem leaves lanceolate, sagittate at the base; petals spatulate, 2 mm. long; pod erect, about 1.5 cm. long, nearly 1 mm. wide, glabrous; style obsolete. *Sisymbrium glaucum* Nutt. Prairies: Colo.—Ida.—Alta. *Plain*—*Submont.*

25. CHEIRINIA Link. WILD WALL-FLOWER, PRAIRIE-ROCKET,
YELLOW PHLOX.

Annual, biennial, or perennial leafy-stemmed herbs, with appressed 2-branched hairs (the hairs appearing as if attached near the middle). Flowers perfect in terminal racemes, usually rather large. Sepals erect, the outer two gibbous at the base. Petals yellow, brown, or purple, clawed, with spreading blades. Filaments free, unappendaged. Pods elongate-linear, more or less 4-angled, or at least with a strong midrib. Style short; stigma 2-lobed. Seeds in one row in each cell, numerous, marginless or margined at the apex. Cotyledons in our species incumbent or nearly so. [*Erysimum* L., in part.]

- Petals less than 1 cm. long.
 - Petals 4-5 mm. long. 1 *C. cheiranthoides*
 - Petals 6-10 mm. long.
 - Perennials or biennials, pods ascending. 2 *C. inconspicua*
 - Annuals, pods spreading. 3 *C. repanda.*
- Petals more than 1 cm. long
 - Petals light yellow.
 - Biennials or short-lived perennials, not caespitose.
 - Pods almost terete, slightly compressed, tapering into a style more than 2 mm. long. 4 *C. arida*
 - Pods 4-angled, style only slightly narrower, very short.
 - Basal leaves, as well as whole plant, grayish-strigose, not silvery.
 - Pods widely spreading, 4-8 cm. long, stout, stem-leaves usually sinuate-dentate. 5 *C. aspera.*
 - Pods strongly ascending or almost erect, 8-12 cm. long (except in *C. brachycarpa*)
 - Stem-leaves usually sinuately dentate. 6 *C. elata*
 - Stem-leaves entire or rarely denticulate.
 - Stem-leaves linear or nearly so, pod usually twisted, slender. 7 *C. asperrima*
 - Stem-leaves oblanceolate; pod straight, stout.
 - Pod about 8 cm. long, 1.5 mm. thick. 8 *C. oblanceolata*
 - Pod 4-6 cm. long, 2.5 mm. thick. 9 *C. brachycarpa*
 - Basal leaves, at least, silvery white; stem-leaves narrowly linear.
 - Plant 2-3 dm. high, stem-leaves sinuate-dentate.
 - Plant 1-2 dm. high, stem-leaves entire.
 - 10 *C. Bakeri*
 - 11 *C. argillosa*
 - Low caespitose perennials
 - Leaves entire-margined or minutely denticulate. 12 *C. nivalis*
 - Leaves sinuate-dentate. 13. *C. radicala*
 - Petals varying from orange to brown or purple.
 - Plant simple, 3-5 dm. high, basal leaves 5-10 cm. long, oblanceolate. 14 *C. Wheeleri*
 - Plant caespitose, 1-2 dm. high; basal leaves 2-4 cm. long, spatulate.
 - Perennial with a branched caudex; stem usually more than 1 dm. high.
 - 15 *C. amoena.*
 - Biennial; stem in flower a few cm. high, more elongate in fruit, leafy only at the base. 16. *C. Pallasii.*

1. *C. cheiranthoides* (L.) Link. Annual; stem 3-6 dm. high, finely strigose; leaves lanceolate or linear-lanceolate, 2-10 cm. long, entire or sinuate-denticulate; petals 4-5 mm. long; fruiting pedicels spreading or ascending; pod 2-3 cm. long, 1-1.5 mm. thick, erect. *Erysimum cheiranthoides* L. WORMSEED MUSTARD. Waste places and river bottoms. Newf.—N.C.—Utah—Alaska; Eu. *Plain*—Mont. Je—Au.

2. *C. inconspicua* (S. Wats.) Rydb. Biennial; stem 3-6 dm. high, angled; leaves linear or oblanceolate, mostly entire, canescent; petals pale yellow, 8-10 mm. long, claw shorter than the sepals; pedicels strongly ascending; pods erect, 1.5-5 cm. long, about 2 mm. thick. *E. asperum inconspicuum* S. Wats. *E. parviflorum* Nutt. Dry soil. Minn.—Colo.—Nev.—B.C. *Plain*—Submont. Je—Au.

3. *C. repanda* (L.) Link. Annual; stem 3-4 dm. high, much branched; leaves lanceolate or oblanceolate, 3-8 cm. long, repand-dentate or the lower coarsely toothed; petals 6-9 mm. long, light yellow; pods 4-8 cm. long, about 2 mm. thick; style very short and stout. *E. repandum* L. Waste places: Ohio—Kans.—Ariz.—Utah; also as a ballast plant at sea-ports; adv. or nat. from Eu. *Plain*—Son. My—Jl.

4. *C. arida* (A. Nels.) Rydb. Biennial; stem branched at the base, 3-4 dm. high; leaves oblanceolate, entire or nearly so, 4-8 cm. long, grayish green; petals 16-20 mm. long, pale yellow; pedicels ascending; pod ascending, subterete, 8-12 cm. long; style 2 mm. long. *Cheiranthus aridus* A. Nels. Desert regions: Wyo.—Utah. Je.

5. *C. aspera* (Nutt.) Rydb. Biennial; stem 2-4 dm. high, mostly simple; leaves lanceolate or linear-lanceolate, usually somewhat sinuately dentate; petals light yellow, 15-18 mm. long; pedicels divergent; pods divergent, 2 mm. thick; beak about 1 mm. long, thick. *Cheiranthus asper* Nutt. *E. asperum* DC. Plains: Man.—Kans.—e N.M.—e Mont. *Plain*—Submont. Je—Au.

6. *C. elata* (Nutt.) Rydb. Biennial; stem 3-10 dm. high, strigose; leaves linear, deeply sinuate-dentate, sometimes almost lyrate-pinnatifid, or the basal ones oblanceolate, petals usually bright yellow, 15-18 mm. long; pedicels ascending, pods usually erect, 4-6 cm. long, 2 mm. thick; beak nearly 2 mm. long. *E. elatum* Nutt. Hills and plains: Sask.—S.D.—N.M.—Calif.—Wash. Submont.—Mont. My—Jl.

7. *C. asperrima* (Greene) Rydb. Biennial; stems 2-5 dm. high, usually simple; leaves linear, 5-8 cm. long; petals 10-15 mm. long, usually pale yellow; pedicels ascending; pods strictly erect, 5-8 cm. long, 1-1.5 mm. thick; beak 1 mm. long. *Cheiranthus asperrimus* Greene. Dry hills: S.D.—N.M.—Ariz.—Mont. Submont. My—Au.

8. *C. oblanceolata* Rydb. Biennial; stem 4-6 dm. high; leaves narrowly oblanceolate, 5-12 cm. long; petals yellow, about 15 mm. long; blades almost orbicular, fruiting pedicels ascending or spreading; pod ascending, about 8 cm. long, about 1.5 mm. thick; style about 1 mm. long. *E. oblanceolatum* Rydb. Mountains. Colo.—Wyo.—Utah. Submont.—Subalp. My—Au.

9. *C. brachycarpa* Rydb. Biennial; stem 3-6 dm. high, grayish canescent; leaves linear-spatulate or oblanceolate, 5-10 cm. long, the lower petioled and minutely denticulate; petals nearly 2 cm. long, bright yellow; fruiting pedicels about 8 mm. long, strongly ascending; pod erect. Hills: Utah. Submont. Je—Au.

10. *C. Bakeri* (Greene) Rydb. Biennial or perhaps perennial; stem 3-5 dm. high, leaves narrowly linear; petals bright yellow, 15-18 mm. long; pedicels strongly ascending, nearly 1 cm. long; pod erect. *Cheiranthus aridus* Greene, not A. Nels. *C. Bakeri* Greene. Hills: N.M.—Colo. Submont. Ap—Je.

11. *C. argillosa* (Greene) Rydb. Biennial; stem usually simple, 1-3 dm. high; leaves linear-lanceolate or linear, crowded below; petals pale yellow, about 1.5 mm. long; pedicels ascending, 5-8 mm. long; pods erect, 5-7 cm. long, 2 mm. thick. *Cheiranthus argillosus* Greene. Clayey bluffs and bad lands: S.D.—Colo. *Plain*. My—Je.

12. *C. nivalis* (Greene) Rydb. Cespitose perennial; stems 1-2 dm. high, very leafy; leaves narrowly oblanceolate to linear, 3-5 cm. long, sparingly pubescent; petals bright yellow, about 15 mm. long; pedicels about 5 mm. long, ascending; pods erect, 3-5 cm. long. *Cheiranthus nivalis* Greene. Summits: Colo. Mont.—Alp. Jl—Au.

13. *C. radicata* Rydb. Perennial, branched at the base; stems 1.5 dm. or less high; leaves linear-oblanceolate, sinuately toothed, 4-7 cm. long; petals light yellow, about 15 mm. long; fruiting pedicels ascending; pods ascending, tetragonal, about 4 cm. long. *E. radicum* Rydb. High mountains: Colo. Subalp.—Alp. Jl.

14. *C. Wheeleri* (S. Wats.) Rydb. A tall strigose biennial or perennial, stem strict, simple, 3-6 dm. high, striate; basal leaves 2-7 mm. wide, subentire or sinuately denticulate, grayish strigose; stem leaves mostly narrowly linear, the upper sessile; pedicels short, ascending, petals with slender claws, about 15 mm. long, varying from orange or brown to rose-purple; pods four-angled, slender, erect, 7-8 cm. long and 1.5 mm. in diameter; beak about 2 mm. long, stout. *E. Wheeleri* Rothr. *E. alpestre* Rydb., in part. Mountains: Colo.—N.M.—Ariz.—Utah. Submont.—Subalp. My—Jl.

15. *C. amoena* (Greene) Rydb. Cespitose perennial; stem 1-3 dm. high; leaves linear-oblanceolate, 4-6 cm. long, more or less sinuate-dentate; petals 15-18 mm. long, brown, purple, or rose, with whitish claws; pedicels ascending, pods erect, 3-5 cm. long. *Cheiranthus nivalis amoenus* Greene. *Erysimum asperum alpestre* Cockerell. *E. Cockerellianum* Daniels. High mountains: Colo. Mont.—Alp. Je—Jl.

16. *C. Pallasii* (Pursh) Rydb. Dwarf biennial; stem 2-10 cm. high, densely leafy; leaves linear-oblanceolate or linear, 1-2 cm. long, sinuate-dentate; sepals scarious-margined; petals deep purple, 10-16 mm. long; pedicels ascending, pods ascending, 4-5 cm. long, 2 mm. thick. *Cheiranthus Pallasii* Pursh. Arctic regions: Greenl.—Alta.—Alaska. Alp.—Subalp. Je—Jl.

26 HESPERIS (Tourn.) L. DAME'S ROCKET, DAME'S VIOLET.

Perennial or biennial herbs, with forked hairs. Leaves simple, dentate. Flowers large, racemose, perfect. Sepals equal, not saccate at base. Petals purple or white, with long claws and broad blades. Pod elongate, nearly cylindric; valves keeled and 1-nerved. Stigma with 2 erect lobes. Seeds in a single row in each cell, globose, wingless. Cotyledons incumbent.

1. *H. matronalis* L. Stem erect, simple; branched above, 3-10 dm. high; leaves 5-20 cm. long, ovate or ovate-lanceolate, dentate, pubescent on both sides; petals purple, pink, or white; pod 5-10 cm. long, ascending or spreading, somewhat torulose when ripe. Fields and roadsides: N.S.—Pa.—Ia.—Mont., escaped from cultivation; native of Eurasia. My—Au.

27. CÂMPÉ Dulac. WINTER CRESS, SCURVY GRASS.

Biennial or perennial herbs with angled stem, and alternate lyrate-pinnatifid leaves. Flowers perfect in racemes or panicles. Sepals erect, the outer two slightly saccate at the base. Petals yellow, spatulate, clawed. Pod elongate, linear, somewhat 4-angled, style short; stigma more or less 2-lobed. Seeds in one row in each cell, flattish, marginless. Cotyledons accumbent. [*Barbarea* R. Br., not Scop.]

Pod obtusely angled; leaves with 1-4 pairs of divisions.

Divisions of the basal leaves 1-2 small pairs, pod slender, ascending.

Divisions of the basal leaves 3-4 pairs; pod stouter, erect and appressed.

Pod sharply 4-angled; leaves with 4-8 pairs of divisions.

1. *C. americana*
2. *C. stricta*
3. *C. verna*.

1. *C. americana* (Rydb.) Cockerell. Biennial; stem 3-5 dm. high, glabrous, strict; divisions of the basal leaves broadly elliptic; stem-leaves with the petioles auriculate-clasping; petals 2-4 mm. long, light yellow; pod 2-2.5 cm. long.

scarcely 2 mm. wide. *B. americana* Rydb. Wet places in the mountains: Mont.—Colo.—Utah—Wash.—B.C. *Plain—Mont.* Je—Jl.

2. *C. stricta* (Andrz.) W. F. Wight. Biennial; stem erect, 3–6 dm. high, glabrous; petals light yellow; pods about 2.5 cm. long, stout, erect and appressed against the rachis. *B. stricta* Andrz. Waste places: Que.—Sask.—Wyo.—Fla.; Wash.—Ida.—Calif.; nat. from Eurasia. Ap—Je.

3. *C. verna* (Michx.) Heller. Biennial; stem branched, 3–6 dm. high; leaves with rounded or elliptic divisions; petals yellow, about 5 mm. long; fruiting pedicels ascending, stout, angled; pods 5–6 cm. long, straight or nearly so, ascending, sharply angled. *B. praecox* (J. E. Smith) R. Br. Waste places: N.Y.—Fla.—Colo.; Calif.—Wash.; adv. from Eu. My—Je.

28. RAPHANUS L. RADISH.

Leafy annuals or biennials. Flowers perfect, in racemes. Sepals erect, the lateral ones somewhat saccate at the base. Petals large, pale yellow, white or light purple. Pod terete, tapering into a distinct beak, one-celled or transversely divided by several false partitions, more or less moniliform. Seeds globular, pendulous. Cotyledons conduplicate. Stamens unappendaged.

1. *R. sativus* L. Annual or biennial; stem branched, 4–5 dm. high, glabrous or nearly so; lower leaves lyrate-pinnatifid with rounded, crenate divisions, more or less hairy, the uppermost lanceolate; petals 15–20 mm. long, with long claws, white and tinged with yellow; pod 4–5 cm. long; body 7–8 mm. thick, gradually tapering into a long beak. Waste places: Que.—B.C.—Calif.—Fla.; —W. Ind.; escaped from cultivation. *Plain—Submont.* F—N.

29. SINAPIS L. MUSTARD, CHARLOCK.

Annual or biennial, caulescent herbs, more or less hirsute. Flowers perfect, in racemes or panicles. Leaves alternate, runcinate-pinnatifid or lobed. Sepals more or less spreading, equal or the outer slightly saccate at the base. Petals yellow, longer than the sepals, clawed. Filaments not appendaged. Pods elongate, nearly terete, more or less constricted between the seeds, the upper portion, containing one seed, produced into a broad and sword-shaped or more or less 4-angled beak. Seeds in one row in each cell, globose, marginless and wingless. Cotyledons conduplicate.

Beak sword-shaped, constituting more than half the length of the pod. 1. *S. alba*.
Beak somewhat 4-angled, but flattened and 2-edged, constituting about one-third the length of the pod. 2. *S. arvensis*.

1. *S. alba* L. Annual; stem 3–6 dm. high, more or less hispid; leaves more or less hirsute, the lower pinnatifid, with rounded toothed divisions, the uppermost often entire; petals yellow, about 1 cm. long; pedicels in fruit spreading; pod densely hispid, about 3 cm. long. Waste places and fields: Me.—Fla.—Calif.—B.C.; nat. from Eu. *Plain—Submont.* Mr—Au.

2. *S. arvensis* L. Annual; stem 3–6 dm. high, more or less hirsute, or glabrous above; lower leaves lyrate-pinnatifid, with a rounded toothed terminal lobe, usually hispid on the veins beneath; upper leaves oblong or lanceolate, merely toothed; petals bright yellow, 8 mm. long; pedicels ascending, about 5 mm. long; pods ascending, 3–4 cm. long; beak about 5 mm. long. *Brassica arvensis* (L.) B.S.P. *B. Sinapis*trum Bois. Fields and waste places: Me.—Fla.—Calif.—Wash.; W. Ind.; nat. from Eu. *Plain—Submont.* My—S.

30. ERUCA (Tourn.) Mill. GARDEN ROCKET.

Annual or biennial, branching herbs. Leaves pinnately lobed or toothed. Flowers perfect, large, racemose. Petals yellowish or purplish, with brown or violet veins. Pod linear, with a long sword-shaped beak; valves with a single strong and several faint nerves; seeds in two rows.

1. *E. Eruca* (L.) Britton Annual; stem glabrous, 3–4 dm. high; lower leaves pinnatifid or lobed, the upper often merely dentate; petals strongly veined; pod 1.5 cm. long or more, erect on erect pedicels. *E. sativa* Lam. Waste places: Ont.—Pa.—Mo.—N.M.—Mont.; adv. from Eu. My—O.

31. BRASSICA L. CABBAGE, RAPE, TURNIP, BLACK MUSTARD.

Annual, biennial, or perennial herbs, caulescent, with alternate leaves. Flowers perfect, in elongate racemes or panicles. Sepals ascending, equal or the outer somewhat saccate at the base. Petals yellow or white, clawed. Filaments free, unappendaged. Pods elongate, linear, terete or somewhat 4-angled, with an elongate-conic seedless beak, the valves 1-3-nerved; stigma truncate or 2-lobed. Seeds in one row in each cell, subglobose, marginless. Cotyledons conduplicate.

None of the leaves clasping.

Pod slender, 4-angled, erect, appressed to the stem.

Pod ascending, terete, but with a strong midvein.

1. *B. nigra*

2. *B. juncea*

Upper stem-leaves clasping

Leaves glaucous, all glabrous except the very earliest ones; petals cream-colored, long-clawed

3. *B. campestris*

Leaves not glaucous, the basal ones distinctly hairy, petals bright yellow, short-clawed.

4. *B. Rapa*.

1. *B. nigra* (L.) Koch. Annual; stem 5-20 dm. high, branching, glabrous or nearly so; lower leaves pinnatifid, with a large rounded or oval terminal lobe and a few small lateral ones; uppermost leaves lanceolate or oblong, entire; sepals yellowish; petals bright yellow, spatulate, 7-8 mm. long; pod 1.5-2 cm. long, a little over 1 mm. thick; beak slender. BLACK MUSTARD. Waste places and fields: Me.—Fla.—Calif.—B.C.; W. Ind.; nat. from Eu. *Plain—Submont. Ap-S.*

2. *B. juncea* (L.) Cosson. Annual or biennial (?); stem erect, 3-12 dm. high, branched, glabrous or nearly so, lower leaves 1-1.5 dm. long, lyrate-pinnatifid, with a large oval dentate end lobe, the upper lanceolate or linear; petals yellow, 8-10 mm. long, broadly spatulate; pod 3.5-5 cm. long, 2-3 mm. thick; beak 5-8 mm. long. Fields and waste places: N.S.—Va.—N.M.—Sask.; adv. or nat. from Asia. *Plain—Submont. Jl-S.*

3. *B. campestris* L. Annual or biennial; stem 3-10 dm. high, glabrous; basal leaves lyrate-pinnatifid, with a large toothed end lobe; stem-leaves lanceolate, entire; petals cream-colored, spatulate, 6-7 mm. long; pod 5-7 cm. long, about 3 mm. thick; beak about 1 cm. long. RAPE, RUTABAGA, SWEDISH TURNIPS. Fields and waste places: N.S.—Mont.—Colo.; escaped from cultivation. *Plain—Submont. Ap-O.*

4. *B. Rapa* L. Annual or biennial, closely resembling the preceding, but greener and more hairy, and with smaller and bright yellow flowers. TURNIP. Waste places: west to Wyo. and Mont.; escaped from cultivation. *Plain. Ap-O.*

32. ATHYSANUS Greene.

Small annuals, branched near the base, with toothed or pinnatifid leaves. Flowers perfect, minute in elongate racemes. Sepals ovate-rounded, spreading, equal at the base. Petals minute, linear, or wanting. Stamens subequal, with slender filaments. Anthers short. Fruit orbicular, 1-celled, 3-4-ovuled, but 1-seeded, wingless, covered with uncinat hairs.

1. *A. pusillus* (Hook.) Greene. Delicate annual; stem branched near the base, pubescent with branched hairs; leaves oblanceolate or obovate, toothed, 8-15 cm. long, stellate; petals white, spatulate, 1.5 mm. long, or in the later flowers usually wanting; fruiting pedicels recurved, 2-3 mm. long; pod orbicular, 2-2.5 mm. broad, hirsute. Dry prairies and hills: Calif.—Ida.—B.C. *Sen.—Submont. F-My.*

33. THYSANOCARPUS Hook.

Slender caulescent annuals, with alternate leaves. Flowers perfect, in slender racemes. Sepals ovate, rounded, spreading. Petals spatulate, white or purplish. Stamens subequal, with slender filaments. Pods orbicular, 1-celled, 1-ovuled, 1-seeded, indehiscent, winged, the wing often toothed on the margins like a cog-wheel or perforated by round holes near the margins; style slender, but short. Pubescence of simple hairs or none.

Pods pubescent; plant glabrous and glaucous.

1. *T. trichocarpus*.

Pods glabrous

Plant more or less hirsute; pod entire-margined, fenestrate, or with thin round areas.

2. *T. elegans*.

Plant glabrous; pod toothed, rarely with fenestrations or thin areas.

3. *T. amplexans*.

1. *T. trichocarpus* Rydb. Stem 1-3 dm. high; lower leaves oblanceolate or oblong, sinuately dentate; uppermost leaves linear or linear-lanceolate, entire; petals slightly over 1 mm. long; pedicels in fruit about 5 mm. long, recurved; pod nearly orbicular, about 4 mm. wide, short-pubescent; wing-margins crenate or lobed, not fenestrate. Dry places: Utah—Ida. Son.—Submont. My.

2. *T. elegans* F. & M. Stem 3-6 dm. high; basal leaves oblanceolate, 3-10 cm. long; upper leaves lanceolate, sagittate at the base; petals spatulate, 2 mm. long, white or pinkish; pod nearly orbicular, 5 mm. wide; wing with 12-14 fenestrations or thinner areas. Sandy or rocky ground: Calif.—Wash.—Ida. Son. Mr—My.

3. *T. amplexans* Greene. Stem 3-5 dm. high; basal leaves oblanceolate, coarsely sinuate-dentate, 2-5 cm. long; stem-leaves linear-lanceolate, auriculate at the base; petals spatulate, about 1.5 mm. long; pods orbicular, with a short cuneate base, crenate on the margin, 5 mm. broad. Sandy places: Ariz.—Utah—N.M. Son.—Submont. Mr—Je.

34. ALYSSUM L. ALYSSUM, SWEET ALYSSUM.

Densely stellate annuals or perennials, with alternate leaves. Flowers perfect in racemes. Sepals ovate or oblong, more or less spreading. Petals whitish, obovate or cuneate to linear. Stamens 6; filaments commonly dilated at the base, in our species not toothed. Fruit orbicular, 2-celled, dehiscent; valves convex. Cotyledons accumbent.

1. *A. alyssoides* (L.) Gouan. Branched annual, stems 1-3 dm. high; leaves linear-oblong or spatulate, 1-3 cm. long, densely stellate-canescens, entire; petals white, or at first yellowish, 3.5 mm. long; pod orbicular in outline, 3 mm. broad, notched at the apex. *A. calycinum* L. Fields and waste places: N.H.—N.J.—Utah—Calif.—B.C.; nat. from Eu. Plain—Submont. My—Je.

35. BERTERÒA DC. HOARY ALYSSUM.

Annual or perennial herbs, stellate or canescent with forked hairs. Leaves alternate, entire. Flowers racemose, perfect. Sepals ascending in anthesis, equal. Petals white, notched. Stamens 6; filaments 2-toothed at the base. Pod oblong (in ours) to nearly globose, only slightly compressed. Seeds winged, several. Cotyledons accumbent.

1. *B. incana* (L.) DC. Stem 3-6 dm. high, branched; leaves numerous, entire, lanceolate or lance-elliptic, pale green, or the lower oblanceolate, petioled; petals 2-3 mm. long, white; pod oblong, 6-8 mm. long, 2.5-3.5 mm. thick, canescent. Waste places and around dwellings: Me.—N.J.—Mo.—Mont.; adv. or nat. from Eu. Je—S.

36. IDAHOA Nels. & Macb. FLAT-POD.

Low scapose annual, with lyrate basal leaves. Flowers perfect, solitary. Sepals broad, erect. Petals small, spatulate, white. Pods suborbicular, strongly flattened parallelly to the partition. Seeds in two rows, reticulate, broadly winged. Cotyledons accumbent. [*Platyspermum* Hook., not Hoffm.]

1. *I. platysperma* (Hook.) Nels. & Macb. Acaulescent, scapiferous annual; leaves basal, petioled, with hastate or lyrate or rarely entire and ovate blades; scapes 2-15 cm. long; sepals 2 mm. long, nearly equalling the white spatulate petals; pod rounded-ovate, 6-10 mm. long, 5-8 mm. wide; seeds broadly winged, 5 mm. broad. *Platyspermum scapigerum* Hook. Prairies and hillsides: Ore.—Calif.—Nev.—Ida. Ap—My.

37. DENTÀRIA L. TOOTHWORT, MILK MAIDS.

Erect scapose, perennial herbs, with often thickened rootstocks. Leaves basal; blades palmately cleft or divided. Bracts leaf-like, subopposite or sub-

verticillate. Flowers perfect, in terminal racemes or corymbs. Sepals equal at the base, erect or nearly so. Petals white or purplish, with slender claws and spreading blades. Pods elongate, linear, flattish or nearly terete, the valves with faint or no midnerve, elastically dehiscent from the base; style slender, stigma entire or rarely 2-lobed. Seeds in one row in each cell, somewhat flattened, but not margined. Cotyledons accumbent.

1. *D. rupicola* (O. E. Schulz) Rydb. Perennial, with tuberous rootstock, stem glabrous, 1-3 dm. high; basal leaves palmately divided into 3-5 mucronate oval divisions; stem-leaves or bracts 1-3, 3-5-divided, with elliptic-oblong divisions; petals 10 mm. long, white; pods about 3 cm. long, nearly 2 mm. wide, tapering at both ends; beak 5-6 mm. long. *Cardamine californica rupicola* O. E. Schulz. Mountains: Mont. Submont.—Mont. Jl.

38. **CARDAMINE** L. BITTER CRESS.

Annual or perennial herbs, with alternate, entire or pinnate leaves. Flowers perfect, in racemes or panicles. Sepals equal at the base, erect or ascending. Petals white or purple, obovate to narrowly spatulate. Pods elongate, many-seeded, narrow, flattened, the valves nerveless or nearly so, elastically dehiscent at maturity. Seeds in one row in each cell, not margined. Cotyledons accumbent.

Leaves all entire

Plant dwarf, less than 1 dm. high, with a slender rootstock; leaf-blades oval, usually entire-margined. 1 *C. bellidifolia*

Plant more than 1 dm. high, blades at least of the stem-leaves sinuately toothed 2 *C. Douglasii*

Plant 1-4 dm. high, upper leaves subsessile.

Plant 3-6 dm. high, all leaves petioled

Flowers about 1 cm. long; leaves not thick.

Plant glabrous or nearly so

Stem densely pilose; leaves also hairy.

Flowers about 0.5 cm. long, leaves thickish, sinuately round-lobed.

3. *C. cordifolia*

4. *C. infesta*

5. *C. Leibergii*

Some of the leaves at least pinnate.

Petals 5-12 mm. long

Petals 8-12 mm. long, leaflets 3, rhombic, 3-lobed or sinuately 3-toothed.

6. *C. angulata*

Petals about 5 mm. long, leaflets 1-9, the terminal one much larger, cordate, ovate, or reniform, sinuately toothed

Beak of the fruit about 2.5 mm. long.

7. *C. vaillicola*

Beak of the fruit about 1 mm. long

Only a few of the leaves pinnate

5. *C. Leibergii*

8. *C. Breckeri*

Petals 2-4 mm. long.

Leaflets of the stem-leaves usually only 3.

9. *C. unijuga*

Leaflets of the stem-leaves 5-11.

Leaves glabrous, seeds small, more than 12 in each pod.

Beak of the pod less than 1 mm. long.

Stem few-leaved; petals 3-4 mm. long; racemes contracted, corymbiform, shorter than the subtending leaves 10. *C. umbellata*.

Stem very leafy; petals 2-3 mm. long, raceme elongate.

Leaves thin, leaflets usually broad; stem glabrous or nearly so

11. *C. pennsylvanica*

Leaves thick; leaflets of the upper leaves narrow, linear or oblong, stem densely hairy below.

12. *C. multifolia*.

Beak of the pod more than 1 mm. long.

13. *C. acuminata*

Leaves with scattered hairs; seeds large, 6-12 in each pod. 14. *C. oligosperma*

1. *C. bellidifolia* L. Dwarf tufted perennial; stems branching, 5-15 cm. high; leaves petioled, simple; blades 5-10 mm. long; petals spatulate, 3-4 mm. long; pods erect, 2-2.5 cm. long, fully 1 mm. wide, on short pedicels. Arctic-alpine situations: Greenl.—N.H.—Wash.—Alaska; Eu. Alp. Jl—Au.

2. *C. Douglasii* (Torr.) Britton. Perennial, with a slender tuberiferous rootstock; stem more or less pubescent, 1.5-4 dm. high; leaves simple, the lower blades cordate, 1-3 cm. broad, sinuate, the upper ovate, usually coarsely dentate, petals obovate, pink or purple, 8-12 mm. long; pod 2-3 cm. long; beak 3-4 mm. long. *C. rhomboides purpurea* Torr. *C. purpurea* (Torr.) Britt., not Cham & Schlecht. Springy places: Que.—Md.—Mo.—Alta. Boreal. Ap—My.

3. *C. cordifolia* A. Gray. Perennial, with a rootstock; stem 3-6 dm. high; leaf-blades cordate, 2-5 cm. long, sinuately toothed; petals about 1 cm. long,

white, obovate or obovate; pods erect on ascending pedicels, 2-3 cm. long, 1.5 mm. wide; beak very short. Springs and river banks: Wyo.—N.M.—Ariz.—Ida. *Submont.*—*Mont.* Je—Au.

4. *C. infausta* Greene. Stem stout, 3-10 dm. high; leaf-blades rounded-cordate or the lower reniform, simple, coarsely sinuately toothed, 3-4 cm. broad; petals white, broadly spatulate, about 8 mm. long; pedicels in fruit spreading; pods 2.5-3.5 cm. long, ascending, 1.5 mm. wide. *C. cardiophylla* Rydb., not Greene. *C. incana* (A. Gray) A. Nels. River banks and in water: Colo.—Utah. *Submont.*—*Mont.* Je—Au.

5. *C. Leibergii* Holz. Perennial, with a horizontal rootstock; stems glabrous, erect, 1-3 dm. high; leaves simple or the lower divided into 3-5 segments, thick; leaf-blade or terminal segment orbicular or oval, sinuately 5-9-lobed or toothed; petals white, 4 mm. long; pods 2-2.5 cm. long, 1 mm. wide, erect on ascending pedicels; beak very short. *C. callosicrenata* Piper. Moist places in the mountains: Ida.—*Mont.* *Submont.*—*Mont.* Je—Au.

6. *C. angulata* Hook. Perennial, with a strong rootstock; stem glabrous, 4-6 dm. high; leaves pinnate, with 3, rarely 5, petiolulate divisions; divisions of the basal leaves rounded, coarsely toothed, those of the upper leaves rhombic-ovate or -lanceolate, with large, acute lobes; petals white, 8-12 mm. long; pod about 2 cm. long; nearly 2 mm. thick. Wet places and shallow water: B.C.—Ore—Wyo. *Submont.* My—Je.

7. *C. vallicola* Greene. Perennial, with a rootstock; stems erect, 3-5 dm. high, glabrous; leaves pinnate, with 5-9 divisions; terminal divisions rounded, or ovate, often cordate at the base, 2-4 cm. wide; pods erect, 3-3.5 cm. long, 1.5 mm. wide, on ascending pedicels; beak 2.5-3 mm. long. (?) *C. foliacea* Greene. Wet places: Wyo.—Colo. *Submont.* My—Au.

8. *C. Breweri* S. Wats. Perennial, with a rootstock; stem erect, 3-6 dm. high, glabrous or nearly so; terminal division of the leaves oval to rounded, acute, truncate or rarely cordate at the base, 1.5-4 cm. broad, toothed; petals 5-6 mm. long; pods 3-3.5 cm. long, 1.5 mm. wide. Wet places: Mont.—Wyo.—Calif.—B.C. *Submont.*—*Mont.* Je—Jl.

9. *C. unijuga* Rydb. Perennial, with a slender rootstock; stem 2-3 dm. high, glabrous, simple; basal leaves simple, broadly cordate or reniform, 5 mm. wide, sinuately 3-lobed; stem-leaves pinnately ternate, with oblong divisions, or the terminal one rhomboid; petals spatulate, 2 mm. long; pod erect, 1.5-2 cm. long, about 1 mm. wide, seeds 8-12; beak 1 mm. long or less. Wet places: Mont.—Wyo. *Submont.*—*Mont.* Jl—Au.

10. *C. umbellata* Greene. Perennial, with a rootstock; stems 2-5 dm. high, glabrous or nearly so; leaves with 3-7 oval to oblong divisions, or the terminal one rounded or reniform, glabrous; petals spatulate; pods 2-3 cm. long, 1 mm. wide, erect, on ascending pedicels; beak minute. *C. kamtschatica* (Regel) Schulz. Wet places: Alaska—Calif.—Colo.—Alta. *Subalp.* My—Au.

11. *C. pennsylvanica* Muhl. Perennial, with a horizontal rootstock; stem glabrous or nearly so, branched, 2-8 dm. high; leaves with 5-17 oblong, oval, or obovate divisions, or the terminal one orbicular; pod erect or ascending, 2-3 cm. long, 1 mm. wide. Wet places: Newf.—Fla.—Colo.—Ore.—B.C. *Plain*—*Mont.* Ap—Au.

12. *C. multifolia* Rydb. Perennial, with a rootstock; stem about 2 dm. high, very leafy; leaflets 7-13, those of the lower leaves oblong to oblong-obovate or oval, entire or sinuate-dentate, the terminal one larger and obovate; pedicels ascending; pod erect, about 2 cm. long and 0.75 mm. wide. Wet places: B.C.—Utah—Mont. *Plain*—*Mont.* My—Je.

13. *C. acuminata* (Nutt.) Rydb. Perennial, with a rootstock; stems 2-6 dm. high, somewhat pubescent below; leaves with 7-15 oblong to oval divisions, or the terminal one broader, orbicular; petals about 3 mm. long; pod erect or nearly so, 2.5-3 cm. long, 1 mm. wide. Wet places: Mack.—Alta.—(?) Wyo.)—Wash.—Alaska. *Submont.* Je—Au.

14. *C. oligosperma* Nutt. Perennial; stem 1-4 dm. high, pubescent; leaves with 5-11 oval or orbicular, stalked divisions; petals spatulate, about 2.5 mm. long; pods erect, on ascending pedicels, 2-3 cm. long, over 1 mm. wide; beak about 0.5 mm. long. Wet places: B.C.—Calif.—Ida. *Submont.*—*Mont. Mr-Jl.*

39. *DRABA* L. WHITLOW GRASS, *DRABA*.

Annual or perennial herbs, mostly low, often with stellate or branched pubescence. Flowers perfect, in racemes. Sepals equal at the base. Petals yellow or white, longer than the sepals. Pods elliptic to linear, flat; valves nerveless, stigma capitate. Seeds in 2 rows in each cell, neither margined nor winged. Cotyledons usually accumbent.

Winter annuals.

Style slender, 12 mm. long; filaments dilated.

1. *D. asprella*.

Style obsolete.

Pods hairy.

Leaves all crowded on the lower part of the stem; flowers white; racemes short, on long naked peduncles.

Pods linear, appressed-hirsute; leaves entire.

Inflorescence even in fruit corymbiform; petals minute or none

Inflorescence in fruit elongate, petals conspicuous.

Pods oblong or elliptic, with spreading branched pubescence, often stellate, leaves usually toothed

Leaves more or less scattered on the stem, flowers yellow or in age sometimes white.

Basal leaves obovate, ovate, or oblong, stem-leaves ample, pedicels longer than the pods

Basal leaves oblanceolate to oblong; stem-leaves smaller, oblong-lanceolate, pedicels shorter than the pods

Pedicels divergent, leaves hirsute

Pedicels ascending, leaves stellate, not hirsute.

Pods glabrous.

Pedicels in fruit reflexed; petals white.

Pedicels ascending or spreading; petals yellow.

Stem more or less leafy.

Pods 2-4 mm long, stem-leaves thick.

Pods 6-8 mm long; leaves thin.

Basal leaves obovate; stem-leaves several, broad; pedicels twice as long as the pod

Basal leaves oblanceolate; stem-leaves very few and small, pedicels slightly, if at all, longer than the pod.

Stem scapiform or with a single leaf, leaves in a basal rosette.

Basal leaves spatulate, pods more than 1 cm. long.

Basal leaves broadly spatulate, finely stellate; petals white

Basal leaves spatulate, but not broadly so, hirsute as well as stellate, petals yellow (Depauperate forms of)

Basal leaves oblanceolate to linear, hirsute or glabrate; pods 5-8 mm. long.

Basal leaves oblanceolate or spatulate, hirsute.

Basal leaves narrowly linear-oblanceolate, glabrous, except the very sparingly ciliate margins

Perennials; stylo usually evident.

Plants scapose or nearly so.

Pod 16-20 mm. long and 7-8 mm. wide

Pod less than 12 mm. long and 5 mm. wide.

Petals yellow.

Pods about twice as long as broad, 5-12 mm. long.

Pods glabrous or nearly so.

Leaves not stellate, glabrous, except the ciliate margin. (Depauperate variety of)

Leaves more or less stellate over the whole surface.

Leaves broadly spatulate, long-ciliate, especially on the margin; midrib weak

Leaves linear-oblanceolate, scarcely ciliate; midrib strong

Pods pubescent

Leaves obovate, densely and finely white-stellate; midrib indistinct

Leaves spatulate or linear-oblong, sparingly stellate, with a strong midrib.

Plant caespitose, but not densely pulvinate, leaves oblanceolate or spatulate, rather finely stellate, spreading, not densely imbricate.

- Plant densely pulvinate; leaves linear-oblong, villous-hispid as well as stellate, densely imbricate. 20. *D. densifolia*.
- Pods only slightly longer than broad.
- Leaves stellate or with branched hairs.
- Pod ovate or elliptic, compressed.
- Pods densely stellate, about 5 mm. long, fully 4 mm. wide; midrib of the leaves indistinct.
- Leaves densely and closely stellate, thick 21. *D. ventrosa*.
- Leaves sparingly long-hairy or glabrate above 22. *D. sobolifera*.
- Pods sparingly puberulent or glabrous, not more than 3 mm. wide, 3-5 mm. long.
- Leaves oblong to linear; midvein strong
- Plants not densely pulvinate, leaves linear or linear-ob-lanceolate, 5-10 mm. long. 23. *D. oligosperma*.
- Plant densely pulvinate, leaves oblong or linear-oblong, less than 5 mm. long, densely imbricate.
24. *D. andina*.
- Leaves obovate, thick; midvein indistinct.
25. *D. uncinatis*.
- Pod globose. 26. *D. sphaerocarpa*.
- Leaves glabrous except the unbranched ciliations on the margins.
- Leaves densely imbricate, short
- Pod pubescent, midvein of the leaves obsolete.
27. *D. sphaerula*.
- Pod glabrous; midvein of the leaves prominent.
28. *D. pectinata*.
- Leaves not densely imbricate, pod pubescent, 3-6 mm long.
29. *D. Nelsonii*.
- Petals white.
- Leaves finely stellate
- Leaves linear or linear-ob-lanceolate
- Midrib of the leaves strong, pods 4-5 mm long 23. *D. oligosperma*.
- Midribs of the leaves not strong; pods 6-8 mm. long.
30. *D. lapponica*.
- Leaves broadly spatulate or obovate
- Pod oblong to linear, 6-12 mm long.
- Pods 6-8 mm long, not twisted 31. *D. nivalis*.
- Pods 10-15 mm long, more or less twisted. 32. *D. lonchocarpa*.
25. *D. uncinatis*.
- Pods broadly obovate, 3-4 mm long.
- Leaves hirsute-ciliate on the margins, oblanceolate.
- Style obsolete 33. *D. fladnizensis*.
- Style about 1 mm. long. 34. *D. oreibata*.
- Plant leafy-stemmed
- Petals white.
- Petals about 3 mm. long; pods 5-8 mm long.
- Plant 1-2 dm high, densely grayish-stellate, pods longer than the pedicels.
35. *D. cana*.
- Plants about 3 dm. high, greener, pods shorter than the pedicels
36. *D. McCallae*.
37. *D. columbiana*.
- Petals about 2 mm long, pods more than 1 cm long.
- Petals yellow.
- Plants glabrous, except the margins of the leaves, which are occasionally ciliate
- Leaves linear or narrowly linear-ob-lanceolate, thin.
- Leaves much shorter than the flowering stem; pods lance-linear.
38. *D. chrysantha*.
- Leaves almost equalling the flowering stem; pods ovate
39. *D. graminea*.
- Leaves spatulate or broadly oblanceolate, thick.
40. *D. crassa*.
- Plant decidedly hairy
- Pubescence long-hirsute, with simple or slightly branched hairs.
41. *D. streptocarpa*.
- Pubescence short, mostly of stellate or branched hairs.
- Styles 1.5-2 mm. long; pods glabrous or slightly puberulent.
- Pod not twisted; pubescence rather sparse or minute; stem-leaves usually sharply toothed.
- Stem more or less hirsute. 42. *D. spectabilis*.
- Stem minutely appressed-stellate. 43. *D. oxyloba*.
- Pod twisted; pubescence dense and grayish; stem-leaves entire-margined or minutely denticulate. 44. *D. Helleriana*.
- Style 1 mm long; pods densely pubescent.
- Stem erect or nearly so.
- Leaves thin, the basal ones usually over 2 cm. long, the cauline ovate to lanceolate.
- Petals 5 mm. or more long.
- Petals pale yellow; stem-leaves often dentate.
45. *D. luteola*.

Petals bright yellow; stem-leaves entire-margined.

- Petals 3-4 mm. long, pale yellow; stem-leaves entire-margined. 46. *D. surculifera*
 Leaves thick, the basal ones oblanceolate, 1-2 cm. long, the cauline lanceolate or oblong. 47. *D. aureiformis*
 Stem decumbent. 48. *D. aurea*.
 Leaves finely stellate; pods twisted. 49. *D. decumbens*
 Leaves coarsely hairy, with branched hairs, pods not twisted. 50. *D. brachystylis*

1. *D. asprella* Greene. Winter annual, scapose or nearly so; scapes 1 to several, 5-10 cm. high, hirsute with branched hairs; leaves basal, rosulate, oblanceolate, 2-3 cm. long, densely hairy; petals yellow, 4-5 mm. long; pod rather turgid, 5 mm. long or more. Mountains: Ariz.—s Utah. My.

2. *D. micrantha* Nutt. Annual; stems 5-10 cm. high, branched at the base, more or less pubescent; leaves 5-15 mm. long, ovate or elliptic, entire, stellate; petals shorter than the hairy sepals, or none, sometimes in the earlier flowers 2.5-3 mm. long, 2-cleft at the apex; pedicels ascending; pod hispid, 6-12 mm. long, 4 mm. wide. *D. caroliniana micrantha* A. Gray. Dry plains: Ill.—Tex.—Ariz.—Wash. Plain. Mr—Au.

3. *D. coloradensis* Rydb. Annual, leafy below, often branched, 5-10 cm. high; leaves obovate, entire, 1-2 cm. long, 0.5-1 cm. wide, subsessile, coarsely hirsute; petals white, 3-3.5 mm. long, spatulate, emarginate; pods linear-oblong, 10-12 mm. long and nearly 2 mm. wide. Plains and hillsides: N.M.—Colo.—S.D. Plain—Submont. Ap—My.

4. *D. cuneifolia* Nutt. Annual; stem 5-20 cm. high, branched; leaves obovate or cuneate, 1-4 cm. long, usually coarsely toothed above the middle, stellate; racemes elongate in fruit; petals white, 3-4 mm. long; pod 7-15 mm. long, 2 mm. wide, rarely glabrate. Grassy places and plains: Ill.—Fla.—Calif.—Ida. Plain. F—My.

5. *D. nemorosa* L. Winter annuals; stem leafy, 0.5-3 dm. high, branched below; leaves often more or less dentate; petals light yellow, 2-3 mm. long, fruiting pedicels divaricate, 1-2 cm. long; pods oblong, 5-10 mm. long, 2 mm. wide. Hills, prairies, and plains: Mich.—Colo.—Nev.—Ore.—B.C.; Eurasia Plain—Mont. Ap—Au.

6. *D. montana* S. Wats. Winter annual; stem branched or simple, leafy, 1-2 dm. high; basal leaves rosulate, entire or sparingly toothed, hirsute with branched hairs; stem-leaves lanceolate; racemes elongate; petals yellow, 2-3 mm. long; fruiting pedicels 5-8 mm. long; pod erect, oblong, 6-10 mm. long, 2 mm. wide. Mountains: (? N.M.)—Colo.—Utah. Submont.—Mont. Je—S.

7. *D. praealta* Greene. Winter annual; stems usually several from the base, leafy; basal leaves lanceolate or oblanceolate, stellate, 1-3 cm. long, entire or slightly dentate; stem-leaves ovate, small; petals white, spatulate, 2-3 mm. long; fruiting pedicels 5-7 mm. long; pods oblong, about 1 cm. long, 2-3 mm. wide. *D. yellowstonensis* A. Nels. *D. lapilutea* A. Nels. Mountain slopes Wyo.—Alta.—B.C. Submont. Je—Jl.

8. *D. deflexa* Greene. Winter annual; stem stout, 7-10 cm. high, racemose almost from the base; leaves mostly basal, oblong-lanceolate, entire or sparingly toothed, hirsute-ciliate on the margins; petals white; pedicels spreading, much exceeding the pod; pod elliptic, 6-8 mm. long. Dry places: Wyo.

9. *D. brachycarpa* Nutt. Annual; stem usually much branched, stellate, leaves ovate to lanceolate, entire, 1 cm. long or less, thick, finely stellate; petals yellow or whitish, 2 mm. long; pedicels 3-4 mm. long; pod oblong, 2-5 mm. long. Dry hills and fields: Va.—Ga.—La.—Colo.; Ore.—Mont. Plain Mr—My.

10. *D. lutea* Gilib. Winter annual of the habit of *D. nemoralis*; stems 1-4 dm. high, branched; basal leaves obovate or oblanceolate, densely and coarsely stellate; stem-leaves ovate, usually coarsely toothed; petals yellow, or in age paler, 2-3 mm. long; fruiting pedicels 15-30 mm. long, ascending or spreading. pod oblong, 5-10 mm. long, 2 mm. wide. *D. nemorosa leiocarpa* Lindb. (?) D

dictyota Greene. Hills and plains: Hudson Bay—Mich.—Colo.—Ore.—Alaska; Eurasia. *Plain—Mont.* My—Jl.

11. *D. nitida* Greene. Winter annual, often branched at the base; stems 1-3 dm. high, erect; basal leaves rosulate, oblanceolate, 1-3 cm. long, nearly glabrous above, densely stellate beneath; stem-leaves oblong or lanceolate, usually entire; petals yellow, about 2 mm. long; fruiting pedicels ascending, 6-15 mm. long; pod glabrous, erect, 8-15 mm. long, 2 mm. wide. *D. stenoloba* S Wats., not Ledeb. Mountains: Alta.—Colo.—Calif.—B.C. *Submont.—Subalp.*

12. *D. Macouniana* Rydb. Annual, almost scapose; stems ascending or decumbent, less than 1 dm. high, glabrous and shining; basal leaves numerous, broadly spatulate or obovate, 5-10 mm. long, finely stellate; stem-leaf usually one, oval, obtuse, 5 mm. long; petals white, less than 3 mm. long; pod oblong-linear, erect, about 1 cm. long and 2 mm. wide. Summits of the Rocky Mountains: B.C. *Submont.—Subalp.* Jl—Au.

13. *D. crassifolia* Graham. Biennial or short-lived perennial; stems 2-10 cm long, ascending, usually scapiform; basal leaves oblanceolate, 5-15 mm. long; petals yellow, soon turning white, 2-2.5 mm. long; fruiting pedicels ascending, 4-7 mm. long; pod glabrous, 6-7 mm. long, 2 mm. wide. *D. albertina* Greene. Alpine-arctic damp places: Greenl.—Lab.—Colo.—Alaska. *Subalp.—Alp.* Jl—Au

14. *D. Parryi* Rydb. Annual, perfectly glabrous, except a few cilia on the petioles; stems several, usually less than 1 dm. high, scapiform or rarely with one stem-leaf; basal leaves numerous, linear or narrowly linear-oblanceolate, 1.5-2.5 cm. long; petals scarcely 2 mm. long, white or at first light yellow; pods erect, oblong, 5-8 mm. long, 1.5-2 mm. wide. Alpine peaks: Colo.—Wyo. *Subalp.—Alp.* Jl—Au.

• 15. *D. eurycarpa* A. Gray. Densely caespitose; branches short and very leafy; leaves oblanceolate, about 12 mm. long, densely stellate; scape scarcely exceeding the leaves, few-flowered; pod oblong-ovate, acute, glabrous; style 2 mm long; High mountains: Calif.—Nev.—Ida. *Alp.—Subalp.*

16. *D. alpina* L. Scapose perennial; leaves basal, rosulate, oblanceolate, 1-3 cm long, nearly glabrous above, sparingly stellate beneath; scapes 5-15 cm. long, stellate; petals yellow, spatulate, 5-7 mm. long; pod lance-oblong, 7-10 mm. long, 3 mm. wide. Arctic and alpine ridges: Greenl.—Lab.—B.C.—Alaska; arctic Eurasia. *Alp.* Je—Jl.

17. *D. glacialis* Adams. Scapose perennial; leaves basal, rosulate, stellate on both sides, 1-3 cm. long; scape 5-15 cm. high; petals yellow, 5-6 mm. long; fruiting pedicels ascending; pod lance-oblong, 6-8 mm long, 3 mm. wide. *D. laencapsula* Payson. Alpine-arctic situations: Greenl.—Wyo.—Wash.—Alaska; Asia *Subalp.—Alp.* Je—Jl.

18. *D. argyrea* Rydb. A caespitose tufted perennial, with underground horizontal stems, basal leaves obovate, 3-7 mm. long, in dense rosettes, almost silvery; petals yellow, 3 mm. long, obovate; pedicels in fruit 5-8 mm. long; pods lanceolate, 6-7 mm. long, 2.5-3 mm. wide, minutely stellate. Crevices of rocks: Ida. *Subalp.* Jl.

19. *D. incerta* Payson. Caespitose, acaulescent, pulvinate perennial; leaves basal, oblanceolate or linear-oblanceolate, 5-15 mm. long, firm, with a strong midrib; petals yellow, obovate, emarginate, 4-5 mm. long; scapes 5-10 mm. long; fruiting pedicels ascending; pods lance-oblong, pubescent, 6-7 mm. long, 2.5-3 mm. wide. Rocky mountain summits: Alta.—Mont.—Wyo. *Mont.—Alp.*

20. *D. densifolia* Nutt. Densely pulvinate caespitose perennial; leaves basal, rosulate, densely imbricate, less than 1 cm. long, with thick midrib, stellate and hispid; scape 1-5 cm. long, villous; petals yellow, about 5 mm. long; pedicels ascending; pod elliptic, 6-8 mm. long, 3-4 mm. wide, densely stellate. *D. Mulfordae* Payson, typical form with elongate inflorescence and

coarse pubescence. *D. glacialis* γ Hook. *D. vestita* Payson, more common form with corymbose inflorescence and softer pubescence. Rocky places, high mountains: Alta.—Wyo.—Alaska. *Mont.—Alp.* Je—Jl.

21. *D. ventrosa* A. Gray. Densely caespitose pulvinate perennial; leaves numerous and imbricate, obovate or spatulate, 1 cm. or less long; scape 1–2 cm. long, villous-stellate; petals yellow, about 5 mm. long; pod densely stellate, 4–5 mm. long, 4 mm. wide. High mountains: Wyo.—Utah. *Mont.—Subalp.* Jl—Au.

22. *D. sobolifera* Rydb. A low caespitose perennial, but the leafy stolons often somewhat elongate; basal leaves oblanceolate, obtuse or spatulate, 1–2 cm. long and 3–4 mm. wide, thick; peduncles 3–6 cm. long, stout, rather many-flowered; petals yellow, obovate, about 4 mm. long; pedicels in fruit 7–8 mm. long; pod ovate, about 6 mm. long, 3–4 mm. wide. Alpine peaks. Utah. *Subalp.—Alp.* Jl.

23. *D. oligosperma* Hook. Caespitose perennial, profusely branched; leaves 5–15 mm. long, somewhat imbricate; scape in fruit 5–10 cm. high, petals yellow or whitish, 5 mm. long, broadly spatulate; pedicels ascending, 3–5 mm. long; pod ovate, about 4 mm. long, 3 mm. wide. *D. saximontana* A. Nels. Mountains and dry hills: Mack.—Utah—Calif.—Alaska. *Mont.—Alp.*

24. *D. andina* (Nutt.) A. Nels. Caespitose-pulvinate perennial; leaves basal, densely imbricate, about 5 mm. long, oblong or linear-oblong; scape 1–3 cm. high; petals yellow, 4–5 mm. long; fruiting pedicels ascending, 3–5 mm. long, 3–3.5 mm. long, 2.5–3 mm. wide. *D. glacialis* ♂ & ♀ Hook. *D. oligosperma andina* Nutt. *D. oligosperma microcarpa* Blankinship. Dry hills and mountains: Alta.—Wyo.—Utah—B.C. *Mont.—Alp.* My—Je.

25. *D. uncinata* Rydb. Small caespitose and pulvinate perennial; flowering stems scapiform, 2–3 cm. high, sparingly stellate; basal leaves in dense tufts, thick, rounded-obovate, 3–4 mm. long, sparingly stellate; inflorescence corymbiform, few-flowered; pod ovate, 3–4 mm. long and 3 mm. wide. Mountains. Utah. *Subalp.—Alp.*

26. *D. sphaerocarpa* Macbr. & Payson. Much branched caespitose perennial; leaves tufted, oblong or obovate, obtuse, 4–7 mm. long, finely and densely stellate, the midveins indistinct; fruiting racemes elongate; pods 8–12, globose, scarcely at all flattened, ovate, stellate, 2–5 mm. long; style 1 mm. long. Granite washes: Ida.

27. *D. sphaerula* Macbr. & Payson. Densely pulvinate caespitose perennial; leaves 2 mm. long, densely clustered and imbricate, broadly linear, acute; scape slightly longer than the leaves; petals slightly longer than the sepals; fruiting inflorescence corymbose; pods few, broadly lanceolate, 3 mm. long, compressed, stellate; style 1 mm. long. Alpine slopes: Ida. *Alp.* Jl.

28. *D. pectinata* (S. Wats.) Rydb. Caespitose pulvinate perennial; leaves oblong, thick, 3–4 mm. long; midrib very prominent; scape 1–2 cm. long; petals 4 mm. long; pedicels ascending; pod 3–4 mm. long, 2–2.5 mm. wide. *D. globosa* Payson. Dry hills and mountains: Utah—Nev. *Subalp.—Alp.* Jl.

29. *D. Nelsoni* Macbr. & Payson. Caespitose perennial; leaves linear, 5–7 mm. long, 1 mm. wide or less, glabrous, except the strong marginal cilia, the midvein prominent; petals yellow, twice as long as the sepals; fruiting raceme elongate; pods 6–15, broadly lanceolate, 3–6 mm. long, 2–3 mm. wide, pubescent with simple hairs; style about 1 mm. long. Exposed ridges: Wash.—Ida.—Calif. *Subalp.—Alp.* Je—Au.

30. *D. lapponica* Willd. Caespitose tufted perennial; basal leaves 5–15 mm. long; scape 3–7 cm. long; petals 3 mm. long, obovate, white; pedicels 2–4 mm. in fruit; pod oblong, 6–8 mm. long, 2 mm. wide, glabrous. Alpine-arctic regions: Greenl.—B.C.; Eu. *Alp.*

31. *D. nivalis* Liljeb. Caespitose tufted perennial; leaves 5–8 mm. long, densely stellate; scape 1–5 cm. long; petals white, obovate, 3 mm. long; pedicels ascending; pod 6–8 mm. long, 2 mm. wide. Arctic-alpine situations: Greenl.—Lab.—Utah—Alaska; Eu. *Subalp.—Alp.* Je—Au.

32. *D. lonchocarpa* Rydb. Densely caespitose perennial; leaves basal, numerous, spatulate, 3-5 mm. long, densely stellate; petals white, 2-2.5 mm. long, obovate; scape 1-10 cm. long; pedicels almost erect; pod linear, 1-1.5 cm. long, 1.5 mm. wide, usually more or less twisted. *D. laevipes* Hook., not DC. *D. nivalis elongata* S. Wats. Alpine regions in wet places: Alta.—Mont.—Wash.—B.C. *Subalp.*—*Alp.* My-Jl.

33. *D. fladnizensis* Wulfen. Caespitose acaulescent perennial; leaves spatulate or oblanceolate, 1 cm. or less long, rosulate, hirsute-ciliate on the margins or nearly glabrous; peduncles 1-5 cm. long; petals white, 3 mm. long; pod oblong, glabrous, 4-5 mm. long, 2 mm. wide. Alpine-arctic situations: Greenl.—Que.—Colo.—Utah—B.C.; Eu. *Subalp.*—*Alp.* Jl-Au.

34. *D. oreibata* Macbr. & Payson. Caespitose perennial; leaves oblong-linear, obtuse, 4-6 mm. long, ciliate on the margins, the midvein evident; petals white; fruiting raceme elongate; pod narrowly elliptic, 8-10 mm. long, 2-3 mm. broad; style slender, 1 mm. long. Alpine summits: Ida.—Utah. *Subalp.*—*Alp.* My-Jl.

35. *D. cana* Rydb. Perennial, with a taproot and short caudex, densely grayish stellate; stem 1-2 dm. high; basal leaves numerous, oblanceolate or spatulate, 1-1.5 cm. long, densely stellate; stem-leaves lanceolate to ovate, about 1 cm. long; pedicels short, nearly erect; petals white, about 3 mm. long; pod linear-oblong, 6-8 mm. long, densely pubescent. *D. valda* Gooding. Foot-hills and mountains. Alta.—N.M.—B.C. *Submont.*—*Mont.* Je-Jl.

36. *D. McCallae* Rydb. Perennial with a caespitose base, sparingly stellate but green; stems several, simple, about 3 dm. high; basal leaves spatulate, 10-18 mm. long, entire or nearly so; stem-leaves ovate, sharply dentate or entire; pedicels in fruit erect; petals white, 4-5 mm. long; pod ovate, densely but finely pubescent. Along brooks: Alta. *Mont.* Au.

37. *D. columbiana* Rydb. Perennial, with a caespitose base, sparingly and finely stellate; stems slender, about 2 dm. high, simple; basal leaves many, ciliate on the margin, oblanceolate, 10-15 mm. long, denticulate or entire; stem-leaves ovate to lanceolate; raceme elongate; pedicels ascending; petals slightly over 2 mm. long, white; pods linear-oblong, finely pubescent, over 1 cm. long. Along rivers, in the mountains: B.C.—Yukon. *Subalp.* My-Jl.

38. *D. chrysantha* S. Wats. Caespitose perennial; stems decumbent, 5-15 cm. high, few-flowered; basal leaves narrowly oblanceolate, 2-6 cm. long, entire, ciliate, thin; stem-leaves small; petals 4 mm. long; pods glabrous, 8-12 mm. long; style slender, 1 mm. long. Mountains: Colo.—N.M.—Ariz. *Submont.*—*Subalp.* Au.

39. *D. graminea* Greene. Caespitose perennial; stem 1 dm. or less high; lower leaves numerous, narrowly linear, ciliate, 5 cm. long, 1 mm. wide; stem-leaves few; petals pale yellow, 4 mm. long; pod glabrous, 7 mm. long, 3 mm. wide. High mountains: Colo. *Mont.*—*Subalp.* Jl.

40. *D. crassa* Rydb. Caespitose perennial; stems ascending or decumbent, 5-15 cm. high, sparingly pubescent; basal leaves 2-4 cm. long, rather thick, generally entire, sparingly ciliate; stem-leaves similar, smaller; petals yellow, 3-5 mm. long; pod ovate-oblong, 8-10 mm. long, about 4 mm. wide; style 1 mm. long. High mountains: Mont.—Colo. *Mont.*—*Subalp.* Jl-Au.

41. *D. streptocarpa* A. Gray. Perennial, with a densely caespitose caudex; stems more or less hirsute, 1-20 cm. high, leafy; basal leaves oblanceolate; stem-leaves lanceolate or oblong; inflorescence often branched; pedicels erect, 8-10 mm. long; petals yellow, 5-6 mm. long; pod lance-linear, about 1 cm. long, 2 mm. wide, glabrous, usually twisted; style 1.5-2 mm. long. Mountains: Colo.—N.M. *Submont.*—*Alp.*

42. *D. spectabilis* Greene. Caespitose perennial; stems leafy, 1.5-3 dm. high; basal leaves obovate or spatulate, 2-3 cm. long, rather sparingly stellate; stem-leaves ovate, thin; petals 6-8 mm. long, spatulate, golden yellow; fruiting pedicels ascending or spreading, about 1.5 cm. long; pod 8-10 mm. long, glabrous or hirtellous, 2-2.5 mm. wide. Mountains: Colo.—Wyo. *Mont.*—*Subalp.* Je-Jl.

43. *D. oxyloba* Greene. Cespitose perennial; stems 2-5 dm. high, leafy; basal leaves 2-4 cm. long, oblanceolate, remotely dentate or entire, finely appressed-stellate; stem-leaves ovate or lanceolate; petals golden yellow, 4-5 mm. long; pedicels ascending-spreading, about 8 mm. long; pods 8-10 mm. long, 2 mm. wide, finely pubescent. Mountains: Colo. *Submont.*—*Mont.* Jl.

44. *D. Helleriana* Greene. Cespitose perennial; stems 2-4 dm. high, hirsute, with branched hairs; basal leaves spatulate or oblanceolate, 2-3 cm. long, loosely stellate; stem-leaves oblong or lanceolate; petals golden yellow, 6 mm. long; pedicels about 1 cm. long, ascending; pod nearly 1 cm. long. *D. aurea stylosa* A. Gray. Cañons in the mountains: N.M.—Colo.—Utah. *Submont.*—*Mont.* My-Jl.

45. *D. luteola* Greene. Cespitose perennial; stem 1.5-4 dm. high, cinerous-stellate; basal leaves oblanceolate, usually entire, 2-5 cm. long; stem-leaves entire or dentate; petals 5-6 mm. long, light yellow; pedicels ascending, 7-8 mm. long; pod erect, 10-18 mm. long, 3 mm. wide, stellate. Mountains: Colo.—Utah. *Mont.*—*Alp.* Jl.

46. *D. surculifera* A. Nels. Cespitose perennial; stems 2-4 dm. high, stellate and villous; basal leaves 3-5 cm. long, oblanceolate, finely and rather sparingly stellate; petals 5 mm. long, golden yellow; pedicels 3-4 mm. long; pod lanceolate, 8-12 mm. long, finely stellate, straight or somewhat twisted. Mountains: Wyo.—S.D. *Submont.*—*Mont.* Jl—Au.

47. *D. aureiformis* Rydb. A slender, cespitose, grayish stellate plant; stem strict, 2-4 dm. high; basal leaves spatulate, 2-3 cm. long, acute, entire, stem-leaves closely sessile, oblong-lanceolate; pedicels ascending; pod erect, linear to oblong-lanceolate, 10-15 mm. long, about 3 mm. wide, slightly if at all twisted, stellate. *D. Bakeri* Greene. Mountains: Utah—Colo.—S.D. *Mont.*—*Alp.* Je—Au.

48. *D. aurea* Vahl. Cespitose perennial; stem 1-4 dm. high; basal leaves oblanceolate, 1-2 cm. long, thick, densely stellate; petals yellow, 4-6 mm. long; pedicels in fruit about 5 mm. long; pods lanceolate, 10-12 mm. long, 2-3 mm. wide, often twisted, pubescent. *D. uber* A. Nels. Mountains and alpine regions: Greenl.—Lab.—Colo.—Ariz.—B.C.; Eu. *Alp.*—*Mont.*

49. *D. decumbens* Rydb. Perennial with a short cespitose caudex; stems decumbent, 1-2 dm. high, sparingly pubescent, few-leaved; basal leaves numerous, broadly spatulate, entire, 2-4 cm. long, finely grayish stellate, rather thick; stem-leaves ovate to ovate-lanceolate, sessile, entire; petals pale yellow, about 4 mm. long; pedicels very short; pod oblong, 8-15 mm. long, densely pubescent. Summits: Colo. *Alp.* Au.

50. *D. brachystylis* Rydb. Perennial; stems several, decumbent or ascending, with divergent branches, 1-1.5 dm. high, hirsute; basal leaves oblanceolate or spatulate, 1.5-2 cm. long; stem-leaves few, oblong or lanceolate, sessile; pedicels short; pod oblong, finely stellate, 8-12 mm. long, ascending; style almost obsolete. Mountains: Utah. *Subalp.* Jl.

40. *ARABIS* L. ROCK CRESS, WILD CANDYTUFT.

Annual or perennial herbs, glabrous, or pubescent with branched hairs. Leaves alternate, in ours mostly toothed. Flowers perfect, in terminal or axillary racemes. Sepals equal or nearly so, sometimes saccate at the base. Petals white, rarely yellowish, pink, or purple, mostly clawed. Stamens 6; filaments free, unappendaged. Pods sessile, elongate, flat, the valves sometimes nerved, not elastically dehiscent; stigma capitate or 2-lobed. Seeds in 1-2 rows in each cell, marginless, margined, or winged. Cotyledons accumbent or nearly so.

Basal leaves lyrate-lyobed; perennials.

Basal leaves entire-margined or toothed.

Pods erect or nearly so.

Leaves coarsely hirsute.

Stem-leaves neither cordate nor auricled at the base.

Stem-leaves cordate or auricled at the base; biennials.

I. LYRATAE.

II. FURCATAE.

III. HIRSUTAE.

Leaves not coarsely hirsute; perennials.

Pubescence, if any, sparse and consisting of 2-forked or rarely 3-forked hairs.

IV. DRUMMONDIANAE.

Pubescence of at least the lower leaves decidedly stellate.

V. MICROPHYLLAE.

Pods spreading or reflexed.

VI. PULCHRAE.

Pods and calyx stellate.

Pods not stellate

VII. SUFFRUTESCENTES.

Pods 3-4 mm. wide.

Pods 1-2.5 mm. wide.

Pods spreading or somewhat recurved on spreading pedicels

Pods only 1-1.5 mm. wide.

VIII. MACOUNIANAE.

Pods 1.5-2.5 mm. wide.

Perennials, with a caudex.

Plant tall, 3 dm. or more high, suffrutescent at the base.

IX. PERENNANTES.

Plant low, 1-2 dm. high, caespitose.

X. RECONDITAE.

Stout biennials or short-lived perennials, 3 dm. high or more.

XI. ARCUATAE.

Pods and pedicels reflexed.

XII. RETROFRACTAE

I. LYRATAE.

Pods about 0.75 mm. wide, style more than 0.5 mm. long.

1. *A. lyrata*.

Pods fully 1 mm. wide, style almost obsolete.

2. *A. ambigua*.

II. FURCATAE

Seeds not winged; leaves hairy; pods 1 mm. wide or less.

3. *A. Nuttallii*.

Seeds winged at the lower end, leaves merely ciliate on the margins; pods 1.5-2 mm. wide.

4. *A. furcata*.

III. HIRSUTAE.

All sepals narrowly oblong; two of them with slightly saccate bases; petals 3-5 mm. long, yellowish white, less than twice as long as the sepals.

5. *A. ovata*

Two of the sepals with strongly saccate bases, almost twice as broad as the others; petals 6-10 mm. long, pure white, fully twice as long as the sepals.

6. *A. rupestris*.

IV. DRUMMONDIANAE.

Stems 3 dm. high or more, solitary or 2 or 3 from the same root.

Pods about 1.5 mm. wide.

7. *A. Drummondii*.

Pods about 3 mm. broad.

8. *A. connexa*.

Stems less than 3 dm. high, several from a caespitose caudex.

Pods strictly erect, blunt.

9. *A. albertina*.

Pods rather ascending, acute

10. *A. Lyallii*.

V. MICROPHYLLAE.

Stems more than 3 dm. high; basal leaves 3-10 cm. long.

11. *A. oblancoolata*.

Stems usually less than 3 dm. high, from a branched caudex; basal leaves 1-2 cm. long.

Plant green; petals 7-8 mm. long; pods fully 2 mm. wide; stem-leaves ovate-lanceolate.

12. *A. oreophila*.

Plant grayish, petals about 5 mm. long; pods 0.75-1.5 mm. wide; stem-leaves oblong or linear, the lower oblanceolate.

Flowers few, pods more than 1 mm. wide; seeds somewhat 2-ranked; stem hirsute-ciliate below or glabrous.

13. *A. microphylla*.

Flowers many; pods less than 1 mm. wide; seeds strictly in one row; stem finely stellate.

14. *A. Crandallii*.

VI. PULCHRAE.

Seeds distinctly in two rows; stem-leaves not auricled.

Petals purple, 8-10 mm. long.

15. *A. pulchra*.

Petals white, 10-12 mm. long.

16. *A. formosa*.

Seeds in one row; stem-leaves more or less auricled; petals 5-8 mm. long.

17. *A. subptinnatifida*.

Leaves usually coarsely toothed; petals pink, 6-8 mm. long.

18. *A. MacDougalii*.

Leaves entire; petals white, 5-6 mm. long

VII. SUFFRUTESCENTES.

Stems suffrutescent at the base; pods reflexed.

19. *A. suffrutescens*.

Stems not suffrutescent, pods spreading.

20. *A. drepanoloba*.

VIII. MACOUNIANAE.

Petals about 4 mm. long; pod 3-4 cm. long; basal leaves 1-2 cm. long.

21. *A. Macounii*.

Petals about 8 mm. long, pod 4-6 cm. long; basal leaves 4-6 cm. long.

22. *A. arctidea*.

IX. PERENNANTES.

One species.

23. *A. perennans*.

X. RECONDITAE.

Leaves finely stellate.

Leaves thick, canescent; stems simple.

Pod about 1.5 mm. wide, acute.

24. *A. Lemmonii*.

- Pod about 2 mm. wide, obtuse.
 Leaves thin, green; stem branched.
 Leaves more coarsely hairy, with branched hairs or merely ciliate on the margins.
 Leaves densely hairy.
 Leaves sparingly hairy or merely ciliate.
 Plant green, not glaucous; pods 3 cm. long; seeds in one row but irregularly so.
 Leaves firm, ciliate or somewhat hairy.
 Leaves thin, almost perfectly glabrous.
 Plant glaucous or bluish-green; pods 4-5 cm. long; seeds in two rows
25. *A. Egglestonii*.
 26. *A. recondita*.
 27. *A. setulosa*.
 28. *A. rugocarpa*.
 29. *A. oxylobula*.
 30. *A. spatulifolia*.

XI. ARCUATAE.

- Pedicels and calyx long-ciliate
 Pedicels glabrous or merely stellate.
 Calyx more or less stellate; petals 8 mm. long.
 Stem 3-6 dm. high; basal leaves 2-4 cm. long, entire.
 Stem 5-10 dm. high; basal leaves 5-10 cm. long, denticulate.
 Calyx glabrous or nearly so.
 Leaves decidedly stellate; plants biennial
 Pods straight or slightly curved upwards, ascending-spreading
 Pods more or less arcuate and somewhat drooping.
 Pods 8-10 cm. long, petals 8-10 mm. long.
 Pods 4-6 cm. long, petals 5-8 mm. long.
 Stem-leaves narrowly lanceolate.
 Petals 8-10 mm. long, purple.
 Petals about 5 mm. long, white or pinkish.
 Stem-leaves ovate, or oblong.
 Leaves coarsely stellate-hirsute; plants perennial.
 Stem-leaves conspicuously sagittate at the base; sepals linear-oblong.
 Stem-leaves with inconspicuous auricles at the base; sepals broadly elliptic.
 Basal leaves sparingly hirsute; stem-leaves lanceolate, 1.5-3 cm. long.
 Basal leaves densely hairy, stem-leaves oblong-lanceolate, 1-1.5 cm. long
31. *A. perelegans*
 33. *A. Bourgovii*.
 34. *A. Selbyi*
 32. *A. brachycarpa*.
 35. *A. Stokesiae*.
 36. *A. divaricarpa*
 37. *A. densicaulis*
 38. *A. fruchcosa*.
 39. *A. gracilentia*.
 40. *A. Fendleri*.
 27. *A. setulosa*.

XII RETROFRACTAE.

- Stem-leaves decidedly sagittate at the base
 Plants not densely caespitose, stem mostly solitary (except in *A. lignifera*); biennials
 Pedicels of the fruit merely recurved.
 Leaves dentate.
 Leaves entire
 Seeds in one row; pod 3-4 cm. long; sepals stellate.
 Seeds in two rows, pod less than 3 cm. long, sepals glabrous
 Pedicels in fruit strictly reflexed.
 Seeds in one row, pods 4-7 cm. long.
 Petals 6-10 mm. long, stem-leaves usually ample.
 Racemes not secund.
 Racemes secund.
 Petals about 5 mm. long; stem-leaves narrow, serrulate
 Seeds in two rows; pod 1.5-3.5 cm. long.
 Plant densely caespitose; basal leaves linear-oblong-lanceolate; perennials.
 Stem-leaves scarcely sagittate at the base.
 Plant 3 dm. high or more, sparingly stellate, flowers numerous.
 Plant 1-2 dm. high, densely stellate below, flowers few.
41. *A. consanguinea*.
 42. *A. lignifera*.
 43. *A. brevistiqua*.
 44. *A. rhodantha*.
 45. *A. retrofracta*.
 46. *A. lignipes*.
 47. *A. caduca*
 48. *A. canescens*.
 49. *A. exilis*.
 50. *A. pendulocarpa*.

1. *A. lyrata* L. Stem 1-3 dm. high, glabrous or sparingly pubescent below; basal leaves 2-5 cm. long, sparingly hairy or glabrate; stem-leaves spatulate to linear, 1-2.5 cm. long; petals 6-8 mm. long, white; fruiting pedicels ascending or spreading, 6-8 mm. long; pods 1.5-3 cm. long. Rocky places: Conn.—S.C.—Mo.—Sask. Boreal. Ap-Jl.

2. *A. ambigua* DC. Stem branched at the base, 2-4 dm. high, glabrous or nearly so; basal leaves glabrous or sparingly pubescent, 2-4 cm. long; stem-leaves spatulate, entire or toothed; petals white, about 6 mm. long; pedicels in fruit ascending, about 1 cm. long; pods erect or nearly so, 2-3 cm. long. Wet rocky places: Alta.—Mont.—Wash.—Alaska; e Asia. Subalp. My-Au.

3. *A. Nuttallii* B. L. Robins. Biennial or perennial, more or less caespitose; stems 1-3 dm. high, sparingly hirsute below; basal leaves short-petioled, spatulate, 1-3 cm. long; stem-leaves oblanceolate, sessile; petals white, 4-6 mm. long; pedicels 8-15 mm. long; pods 1-3 cm. long. *A. spathulata* Nutt., not DC. Mountains: Mont.—Utah—Wash. Submont.—Mont. My-Jl.

4. *A. furcata* S. Wats. Perennial, with a caespitose caudex or rootstock; stems 1-3 dm. high, glabrous; basal leaves spatulate, 2-4 cm. long, often ciliate on the margin; stem-leaves oblong or oblanceolate; petals 7-8 mm. long; pedicels 5-15 mm. long; pods 2-3.5 cm. long. *A. Bridgii* M. E. Jones. Mountains: Wash.—Mont.—Ore. *Submont.*—*Mont.* My—Au.

5. *A. ovata* (Pursh) Poir. Stem simple or branched above; basal leaves oblanceolate or spatulate, 1-8 cm. long, slightly toothed or entire; stem-leaves lanceolate, cordately or sagittately clasping, usually sinuate-dentate, 2-8 cm. long; petals 4-5 mm. long; pedicels 5-7 mm. long; pods 3-4 cm. long, 1 mm. wide; style very short. *A. hirsuta* Hook., not Scop. Among rocks and in waste places: N.B.—Ga.—Calif.—Alaska. *Plain*—*Mont.* My—Au.

6. *A. rupestris* Nutt. Stems simple, hirsute, 3-5 dm. high; basal leaves spatulate, 2-5 cm. long, sinuately toothed; stem-leaves lanceolate, cordate-clasping; petals 6-10 mm. long; pedicels 5-10 mm. long; pod 4-6 cm. long, more than 1 mm. wide. Dry places and among rocks: Sask.—(? Colo.)—Utah—Ore.—Alaska. *Submont.* Ap—Je.

7. *A. Drummondii* A. Gray. Stems simple and strict, 3-6 dm. high; basal leaves oblanceolate, 2-4 cm. long, glabrous or somewhat pubescent; stem-leaves lanceolate, sagittate-clasping, glabrous and glaucous; petals white or pink, 6-10 mm. long; pedicels 5-10 mm. long; pod 5-8 cm. long, 1.5-2 mm. wide; seeds winged, in two rows. *Streptanthus angustifolius* Nutt. *Turritis stricta* Grah. *Arabis philonipha* A. Nels. *A. oxyphylla* Greene. Mountains: Alta.—N.M.—Utah. *Submont.*—*Subalp.* My—Au.

8. *A. connexa* Greene. Closely resembling the preceding and perhaps not distinct, differing in the stronger and more branched caudex, spatulate basal leaves, shorter, less acuminate stem-leaves, and broader pod, which is 5-8 cm. long. Mountains: Alta.—Colo.—Utah. *Mont.* Je—Jl.

9. *A. albertina* Greene. Stem 1-2 dm. high, glabrous, simple; basal leaves oblanceolate, 1-2 cm. long; stem-leaves narrowly lanceolate, auriculate-clasping; inflorescence short; petals purple or rose-colored, about 8 mm. long; pedicels 5-10 mm. long, erect; pod 2-6 cm. long, 2 mm. wide. *A. Drummondii Wardii* A. Gray. Mountains: Alta.—Wyo.—Utah—Wash. *Submont.*—*Mont.* Jl—Au.

10. *A. Lyallii* S. Wats. Perennial, with a branched caudex; stems 1-2 dm. high, erect or ascending; basal leaves narrowly oblanceolate, the petioles ciliate; stem-leaves few, lanceolate; petals purple, 7-8 mm. long; pedicels 5-10 mm. long, ascending or rarely erect; pods 4-5 cm. long, 2 mm. wide. Mountains: B.C.—Mont.—Calif. *Submont.*—*Subalp.* My—Au.

11. *A. oblanceolata* Rydb. Stem branched at the base, 3 dm. or more high; basal leaves sparingly stellate-pubescent, oblanceolate, entire; stem-leaves sessile, lanceolate, sagittate-auricled at the base; sepals white-hairy near the apex; petals dark reddish purple, 7-8 mm. long; pods ascending, about 5 cm. long and 2 mm. wide, glabrous; seeds in two rows. Mountains: Colo. *Mont.*—*Subalp.* S.

12. *A. oreophila* Rydb. Stems 1-2 dm. high; basal leaves numerous, broadly oblanceolate or spatulate, stellate-pubescent; petals yellowish white below, upper portion rose or purplish; pods glabrous, 3-6 cm. long, slightly arcuate; beak obsolete; seeds in two rows, winged above. *Arabis Drummondii alpina* S. Wats., in part. *A. oreocalis* Greene. Mountains: Utah—Wyo.—Mont. *Mont.*—*Subalp.*

13. *A. microphylla* Nutt. Stems erect, 1-3 dm. high; basal leaves oblanceolate or spatulate, 0.5-3 cm. long, entire, stellate; sepals stellate; petals mostly white, 5 mm. long; pedicels 5-10 mm. long, ascending; pods ascending, 2-4 cm. long. Hills and mountains: Mont.—Utah—Ore.—Wash. *Submont.*—*Mont.* Je—S.

14. *A. Crandallii* B. L. Robins. Stems 2-4 dm. high; basal leaves narrowly oblanceolate, 2-4 cm. long, densely stellate; stem-leaves lanceolate or linear, slightly clasping; sepals stellate; petals 6 mm. long, white; pedicels 5-10

mm. long, erect; pods 4-5 cm. long. *A. stenoloba* Greene. Mountains: Colo. *Submont.* My-Je.

15. *A. pulchra* M. E. Jones. Perennial; stem erect, 3-6 dm. high, stellate-canescens; basal leaves oblanceolate, entire, 3-4 cm. long, densely stellate; stem-leaves linear or linear-lanceolate, not auricled; sepals densely stellate, oblong, 5-6 mm. long; petals dark purple, with light claws, 8-10 mm. long; pods 4-6 cm. long, 3 mm. wide; seeds in two rows. Valleys: Nev.—Calif.—s Utah. *Son.* My-Je.

16. *A. foefosa* Greene. Perennial, somewhat woody at the base; stem about 3 dm. high, densely stellate; lower leaves linear-oblanceolate, 2-4 cm. long, densely stellate, thick; stem-leaves linear, sessile; sepals stellate, broadly elliptic, rounded and slightly scarious at the apex; petals white, 10-12 mm. long; pod 4-5 cm. long, 2-2.5 mm. wide; seeds in two rows. River valleys: n N.M.—e Utah—(? Colo). *Son.* Ap-Je.

17. *A. subpinnatifida* S. Wats. Biennial or perennial; stem 1.5-5 dm. high; basal leaves linear-oblanceolate, entire or sparingly toothed, 2-4 cm. long; stem-leaves numerous, lanceolate, coarsely toothed; pedicels recurved, 5-10 mm. long; pod 4-7 cm. long, 2-3 mm. wide; seeds in one row. Dry regions: Calif.—Ore.—Ida.—Nev. *Son.*

18. *A. MacDougalii* Rydb. Perennial; stem 4-6 dm. high, densely stellate; basal leaves narrowly oblanceolate, 2-4 cm. long, entire or denticulate, densely stellate; stem-leaves linear or linear-lanceolate, sagittate at the base; pedicels reflexed, 5-10 mm. long; pods reflexed, 4-5 cm. long, 1.5 mm. wide; seeds in one row. Mountains: Mont.—Nev. *Mont.* Je.

19. *A. suffrutescens* S. Wats. Suffrutescent perennial; shoots of the season 1-3 dm. long, glabrous; leaves narrowly oblanceolate, glabrous or nearly so, thick and shining, 3-5 cm. long; upper stem-leaves lanceolate, somewhat sagittate at the base; petals purplish, 6 mm. long; pods 4-7 cm. long, glabrous, about 4 mm. wide, tapering into a short beak. Mountains: Wash.—Ida.—Calif. *Submont.*—*Mont.* Je-Au.

20. *A. drepanoloba* Greene. Perennial, with several decumbent stems, 2-3 dm. high; basal leaves oblanceolate, 1-3 cm. long, minutely stellate; stem-leaves lance-oblong, sagittate, glabrous; petals rose or pink, 6-8 mm. long; pedicels spreading, 5 mm. long; pods 3-5 cm. long, 3 mm. wide; style very short. Mountains: Alta. *Mont.* Jl-Au.

21. *A. Macounii* S. Wats. Biennial or perennial, branched at the base; stems 2-3 dm. high, sparingly hirsute below, glabrous above; basal leaves stellate, oblanceolate, 1-2 cm. long; stem-leaves linear, sagittate at the base, glabrous; petals 4 mm. long, rose-colored; pedicels spreading; pods glabrous, slightly curved, mostly divaricate, 3-4 cm. long; seeds in one row. Valleys: B.C. *Submont.* My.

22. *A. arcolea* A. Nels. Perennial, with a woody taproot, and short branched caudex; stems erect, 2-5 dm. high, densely hirsute below, glabrate above; leaves entire, the basal ones petioled, narrowly linear-spatulate, densely sub-stellate; stem-leaves auriculate-clasping, linear; pedicels ascending; petals purple or violet; pod arcuate-spreading; seeds in a single row, broadly winged. Dry sandy soil: Ida. My.

23. *A. perennans* S. Wats. Perennial, with a branching caudex, often suffruticose at the base; stems 3-4 dm. high; lower leaves 2-3 cm. long, petioled, spatulate or linear-spatulate, stellate; sepals stellate; petals 4-5 mm. long, pale; pods 4-6 cm. long, arcuate, on spreading pedicels; seeds in one row. Dry plains and valleys: Wash.—Utah—Ariz.—s Calif. *Son.*—*Submont.* Ap-My.

24. *A. Lemmonii* S. Wats. Stems 1-2 dm. high, ascending or erect; basal leaves spatulate, 1-3 cm. long; stem-leaves lanceolate or oblong, sometimes auricled; sepals stellate; petals rose or purple, 5-6 mm. long; pedicels 2-6 mm. long, spreading; pods somewhat arcuate-spreading, 3-4 cm. long, glabrous; style obsolete. *L. bracteolata* Greene, a form with short stem-leaves. Mountains: Mont.—Utah—Calif.—B.C. *Submont.*—*Mont.* Jl-Au.

25. *A. Egglestonii* Rydb. Stems several, about 1 dm. high, decumbent at the base, glabrous; basal leaves crowded, spatulate, thick, 1-2 cm. long; stem-leaves elliptic or lanceolate, less than 1 cm. long, more or less auricled at the base; petals light purple, about 4 mm. long; pods spreading on short spreading pedicels, glabrous, 2-2.5 cm. long, obtuse at the apex. High mountains: Colo. Alp. Jl.

26. *A. recondita* Greenc. Stems glabrous, about 3 dm. high, branched; basal leaves thin, obovate, more or less dentate; stem-leaves lanceolate, auriculate-clasping; sepals with scattered stellate hairs; petals rose-purple, 5 mm. long; pedicels spreading, about 8 mm. long; pod curved, glabrous, 2.5-3.5 cm. long. Mountains: Colo.—Ariz. Submont. Je.

27. *A. setulosa* Greenc. Stems 2-3 dm. high; basal leaves oblanceolate, 1-2 cm. long; stem-leaves glabrous, somewhat sagittate at the base; sepals sparingly stellate; petals white, 6-7 mm. long; pedicels spreading, curved; pod spreading or recurved, 3-4 cm. long; seeds slightly 2-rowed. *A. Fendleri* A. Nels., not Greenc. *A. Diehlii* M. E. Jones. Dry hills: Wyo.—Colo.—Utah. Submont. My-Je.

28. *A. rugocarpa* Osterhout. Stems 1-2 dm. high; basal leaves oblanceolate, 2-3 cm. long; stem-leaves small, linear, often with small auricles at the base; petals 5 mm. long, rose or pale purple; pod 3 mm. long, spreading or pendulous. *A. aprica* A. Nels. Mountains: Colo.—Wyo. Submont.—Mont. Je.

29. *A. oxylobula* Greenc. Stems about 1 dm. high; basal leaves narrowly linear-oblanceolate, about 2 cm. long; petals pink, 4 mm. long; pedicels about 5 mm. long, spreading; pods 1.5-2.5 cm. long; seeds almost in one row. Mountains: Colo. Submont. Je.

30. *A. spatifolia* Rydb. Stems 2-3 dm. high; basal leaves narrowly oblanceolate, 2-3 cm. long, stem-leaves linear-lanceolate, sagittate at the base; petals 4-5 mm., pinkish; pedicels spreading or somewhat reflexed, 8-10 mm. long; pods 4-5 cm. long; style obsolete. Mountains: Colo. Submont. Jl.

31. *A. perelegans* A. Nels. Biennial; stem strict, 5-7 dm. high, hirsute with branched hairs below, glabrous above; basal leaves oblanceolate, more or less dentate, finely stellate, 3-5 cm. long; stem-leaves linear-lanceolate, sagittate at the base, glabrate; petals dark purple to nearly white, 8-10 mm. long; pedicels 5-8 mm. long, ascending or spreading; pods arcuate-spreading, 6-8 cm. long, nearly 2 mm. wide. *A. arcuata subvillosa* S. Wats. *A. elegans* A. Nels. Open woods and slopes: Mont.—Wyo.—Utah—Wash. Son.—Submont. Ap-Je.

32. *A. brachycarpa* (T. & G.) Britton. Stem 4-6 dm. high; basal leaves oblanceolate, usually dentate, 2-5 cm. long; stem-leaves lanceolate, sagittate at the base, glabrous; petals pink, about 8 mm. long; pedicels about 5 mm. long, spreading or ascending; pods usually spreading, 2-5 cm. long, 2 mm. wide; seeds in two rows. Dry ledges: Que.—Mich.—Alta. Plain. My-Au.

33. *A. Bourgoyii* Rydb. Stem 3-6 dm. high; basal leaves oblanceolate, finely stellate, almost entire, 2-4 cm. long; stem-leaves lanceolate, sagittate at the base; petals pink, 8 mm. long; pedicels spreading, 5-7 mm. long; pods sometimes pendulous, 4-8 cm. long, 2 mm. wide; seeds more or less in two rows. *Turritis patula* Grah. *A. dacotica* Greene, small form. Meadows and hills: Man.—Wyo.—Ida.—Alta. Plain—Submont. Ap-Jl.

34. *A. Selbyi* Rydb. Perennial, with a basal rosette of leaves; these oblanceolate, 5-10 cm. long, short-petioled, acute, sinuate-denticulate, green but stellate on both sides; stem-leaves linear-lanceolate, sagittate at the base; petals red-purple; fruiting pedicels 3-4 mm. long, divergent; pods divergent, about 3 cm. long and 2 mm. wide, obtuse at both ends; seeds in two rows. Cañons: Colo. Mont.

35. *A. Stokesiae* Rydb. Biennial; stem 5-7 dm. high, retrorse-pubescent below, basal leaves oblanceolate, 2-3 cm. long, finely stellate; stem-leaves lanceolate, sagittate at the base, 4-7 cm. long, glabrous; petals pink or purple; pedicels spreading, 7-10 mm. long; pod glabrous, 2 mm. wide. Cañons and hills: Mont.—Utah—Ida. Son.—Submont. My-Je.

36. *A. divaricarpa* A. Nels. Biennial or perhaps perennial, often branched at the base; stems 5-7 dm. high, sparingly retrorse-hairy below; basal leaves 2-4 cm. long, stellate, oblanceolate; stem-leaves lanceolate, sagittate at the base; pedicels 1 cm. or less, spreading; pods straight or slightly arcuate; seeds more or less in two rows. Mountains: Colo.—Utah—Wyo.—Ida. *Mont.* Je-Jl.

37. *A. densicaulis* A. Nels. Biennial; stems several, 3-5 dm. high, glabrous or slightly hirsute near the base; basal leaves oblanceolate, 2-3 cm. long, finely stellate; stem-leaves glabrous, linear, auriculate-clasping at the base, pedicels about 1 cm. long, spreading; pods arcuate, often somewhat drooping, seeds in one row. Wooded gravelly slopes: Wyo. *Jl.*

38. *A. fruticosa* A. Nels. Biennial; stems several, 3-5 dm. high; basal leaves oblanceolate, stellate, entire or denticulate; petals white, 7 mm. long, pedicels 5-7 mm. long, spreading; pods arcuate, 4-5 cm. long, 2 mm. wide; seeds mostly in one row. Dry roadsides: Wyo.—Ida. *Mont.* *Jl.*

39. *A. gracilentia* Greene. Perennial; stems 2-4 dm. high, ascending; basal leaves narrowly oblanceolate, entire; stem-leaves glabrous, linear or linear-oblong; petals 4-5 mm. long, rose-colored or white, pedicels 8-10 mm. long, spreading; pods arcuate, 3-5 cm. long; seeds more or less in two rows. Cañons, plains and mountains: N.M.—Colo.—Utah. *Submont.* Ap-May.

40. *A. Fendleri* (S. Wats.) Greene. Biennial or short-lived perennial; stem 2-5 dm. high; basal leaves oblanceolate, 1-3 cm. long; stem-leaves glabrous, linear-lanceolate; petals 6-7 mm. long, pink or whitish; pedicels 1-2 cm. long, ascending to somewhat recurved; pods somewhat arcuate, 4-6 cm. long, 2 mm. wide; seeds 2-rowed. Mountains: N.M.—S.D.—Wyo. *Submont.*—*Mont.* My-Je.

41. *A. consanguinea* Greene. Biennial or maybe perennial; stems erect, 3-4 dm. high, stellate-canescens; basal leaves 2-3 cm. long, oblanceolate, serrate, finely stellate; stem-leaves lance-oblong, stellate; sepals stellate; petals 5-6 mm. long, pinkish; pedicels about 1 cm. long; pods pendent, 4-5 cm. long, 2 mm. wide, seeds more or less in two rows. Mountains: Colo.—N.M. *Submont.* My-Je.

42. *A. lignifera* A. Nels. Perennial, often branched at the base; stems 2-4 dm. high, minutely stellate below; basal leaves narrowly oblanceolate, entire, 3-6 cm. long, finely stellate, petioled; stem-leaves oblong, 2-4 cm. long; petals white or pinkish, 7-8 mm. long; pods usually pendulous, 3-4 cm. long, 2 mm. wide; seeds in one irregular row. Among sage-brush and on hillsides: Wyo.—Colo.—Utah. *Submont.*—*Mont.* Je-Jl.

43. *A. brevisiliqua* Rydb. Biennial; stems 3-4 dm. high, sparingly strigose-stellate below, otherwise glabrous; basal leaves narrowly oblanceolate, 1-2 cm. long, finely stellate; stem-leaves linear, glabrous, petals purplish, about 6 mm. long; pod 2-4 cm. long, 2 mm. wide; seeds in two rows. Mountains: Alta.—B.C. *Submont.* *Jl*—*Au.*

44. *A. rhodantha* Greene. Biennial; stem erect, 4-6 dm. high, stellate below, otherwise glabrous; basal leaves oblanceolate, 1-5 cm. long, stellate; upper stem-leaves oblong, sagittate at the base; petals pink, 8-10 mm. long; pedicels about 1 cm. long, reflexed; pods pendent, 5-7 cm. long, 2 mm. wide. Scarcely distinct from the next. Mountains and hills: Colo.—Utah. *Submont.*—*Mont.* Je-Jl.

45. *A. retrofracta* Grah. Biennial or perennial; stems 3-5 dm. high, usually stellate throughout; basal leaves oblanceolate, 1-3 cm. long, densely stellate, usually entire; stem-leaves lanceolate, sagittate at the base; sepals stellate; petals 6-8 mm. long, white or pinkish; pedicels 1 cm. long, abruptly reflexed; pods 3-6 cm. long, 2 mm. wide. *A. Holboellii* Am. Auth. *A. Kochii* Blankinship. (?) *A. demissa* Greene. Plains, hills, and mountains: Mack.—Man.—Neb.—Utah—Calif.—B.C. *Plain*—*Mont.* My-Jl.

46. *A. lignipes* A. Nels. Short-lived perennial; stems 3-5 dm. high, finely stellate below, glabrous above; basal leaves entire, narrowly oblanceolate, densely stellate-pubescent, 1-2 cm. long; stem-leaves almost linear, auriculate, revolute; sepals stellate; petals 5-6 mm. long, white or purplish; pedicels abruptly

reflexed; pod 6-8 cm. long, 2 mm. wide. Sandy or stony ground: Wyo.—Mont.—Ida. *Submont.*—Mont. Je—Jl.

47. *A. caduca* A. Nels. Biennial or perennial; stem 2-4 dm. high, slender, sparingly stellate; basal leaves narrowly oblanceolate, 1-2 cm. long, densely and finely stellate; stem-leaves linear, mostly revolute; sepals stellate; petals white, 5 mm. long; pedicels abruptly reflexed; pod 1.5-3.5 cm. long, nearly 2 mm. wide. Mountains: Wyo.—Utah. *Submont.* Jl—Au.

48. *A. canescens* Nutt. Perennial; stems 2-3 dm. high, finely stellate; basal leaves densely stellate-canescens, 1-2 cm. long; stem-leaves linear; sepals stellate; petals white or pale purplish, 4-5 mm. long; pedicels recurved; pods pendulous, 3-5 cm. long, 1.5-2 mm. wide; seeds more or less in two rows. (?) *A. puberula* Nutt. Dry plains: Wyo.—Mont.—Ore. *Submont.* Ap—Je.

49. *A. exilis* A. Nels. Biennial; stems strict, slender, 3-4 dm. high; basal leaves small, 1-2 cm. long, oblanceolate or oblong-spatulate; stem-leaves lanceolate; sepals stellate; petals white or purplish, 5-6 mm. long; pedicels reflexed; pods pendent, 4-6 cm. long, 2 mm. wide; seeds in two rows. Sage-brush plains: Wyo.—Mont.—Utah. *Son.*—Mont. Je—Au.

50. *A. pendulocarpa* A. Nels. Perennial; stem simple, about 2 dm. high; basal leaves oblong-oblanceolate, 1 cm. or less long; stem-leaves linear-oblong or lanceolate, 5-10 mm. long; petals about 5 mm. long, white or tinged with purple; pedicels recurved; pod 4-6 cm. long, 2 mm. wide; seeds in two rows. Cliffs and rocky ridges: Wyo. *Submont.* Je.

41. *PARRYA* R. Br.

Acaulescent perennials, with branched caudex. Flowers perfect, racemose. Sepals oblong, erect, the lateral ones gibbose at the base. Petals pink or purple, with long claws and broad blades. Anthers included, oblong, sagittate at the base. Pods with flat, 1-nerved, reticulate valves; stigma 2-lobed. Seeds margined or winged; cotyledons strictly accumbent.

1. *P. platycarpa* Rydb. Leaves basal, runcinate, more or less glandular-hirsutulous, thick, 6-8 cm. long, oblanceolate in outline; scape 1-1.5 cm. long, glandular-hirsutulous; petals 15-18 mm. long, purplish; fruiting pedicels 8-15 mm. long, ascending; pod erect, glandular-hispidulous, 3-4 cm. long, 6-7 mm. wide, acute at both ends; seeds broadly winged, 3-4 mm. wide. *P. macrocarpa* S. Wats, not R. Br. High mountains: Utah. *Alp.*—*Subalp.* Jl—Au.

42. *PHOENOCALIS* Nutt.

Low leafy perennials, with thick caudex. Flowers perfect, racemose. Sepals erect, the lateral gibbose at the base. Petals purple or pink, long-clawed. Pods flat, with 1-nerved, reticulate valves, few-seeded, tapering into a slender style; stigma nearly entire, capitate. Seeds marginless; cotyledons obliquely accumbent.

Pod linear-lanceolate, 3-5 mm. wide, seed-coat not cellular.

1. *P. cheiranthoides*.

Pod lanceolate, 7-10 mm. wide, seed-coat cellular.

2. *P. Huddelliana*.

1. *P. cheiranthoides* Nutt. Stem 1-3 dm. high; basal leaves numerous, petioled, densely white stellate-tomentose, oblanceolate, entire, 5-10 cm. long; stem-leaves small, ovate to lance-linear, in age glabrate; petals about 8 mm. long; fruiting pedicels 1-1.5 cm. long, divaricate; pod horizontal, 2-4 cm. long, glabrous. *Parrya Menziesii* (Hook.) Greene. Mountains: Wash.—Ida.—Nev.—Calif. *Submont.*—Mont. Ap—Je.

2. *P. Huddelliana* (A. Nels.) Rydb. Perennial, with a branched slender deep rootstock; leaves rosulate, narrowly spatulate, 12-25 mm. long, densely stellate-pubescent; flowers corymbose; branches 1-1.5 cm. long; pod lanceolate, 2-3 cm. long, tapering into a short style. *Parrya Huddelliana* A. Nels. High mountains among loose rocks: Ida. *Alp.* Jl.

43. *CARTIERA* Greene.

Glabrous perennials, with fleshy leaves, the cauline ones cordate-clasping. Flowers perfect, in elongate racemes. Calyx urn-shaped; lateral sepals saccate

at the base, all erect, constricted at the throat and with spreading tips. Petals undulate-crisp, with a narrow blade. Stamens 6, distinct; anthers linear, sagittate at the base. Pods flat, linear. Cotyledons accumbent.

1. *C. cordata* (Nutt.) Greene. Stems glabrous, 3-6 dm. high; basal leaves spatulate, thick, usually coarsely toothed, especially towards the summit, pale green; cauline leaves oblong, elliptic or ovate, cordate-clasping; petals linear-lanceolate, a little exceeding the sepals; pod flat, 5-7 cm. long, 4 mm. wide, *Streptanthus cordatus* Nutt. *S. argutus* and *S. crassifolius* Greene. *S. coloradensis* A. Nels. *Cartiera arguta* and *C. crassifolia* Greene. Dry places: Wyo.—N.M.—Calif.—Ore. Son.—Submont. Je-Jl.

44. CAULANTHUS S. Wats. WILD CABBAGE.

More or less succulent biennials or perennials. Flowers perfect, in elongate racemes. Sepals oblong, often colored, the lateral ones more or less saccate at the base, erect, with spreading tips; calyx closed and more or less urn-shaped. Petals undulate-crisped, with a broad claw and a small narrow blade. Stamens 6; anthers linear, sagittate at the base. Pods somewhat flattened or nearly terete, linear; valves 1-nerved, often reticulate-veined; stigmas 2-lobed. Cotyledons incumbent.

Stem glabrous; upper leaves reduced.

Stem inflated

Calyx densely villous.

Calyx as well as the whole plant glabrous.

Stem not inflated.

Stem hirsute, leafy.

1. *C. crassicaulis*.

2. *C. glaber*.

3. *C. procerus*.

4. *C. pilosus*.

1. *C. crassicaulis* (Torr.) S. Wats. Biennial or perhaps perennial; stem inflated, fistulose, 1-2 cm. thick, glabrous, 3-10 dm. high; basal leaves lyrate, glabrous and glaucous, 1-1.5 dm. long; stem-leaves linear or linear-oblongate, petals linear, nearly 2 cm. long; pod ascending, terete, 6-9 cm. long, 2 mm. thick. Rocky places and hills: Ida.—Utah—Calif. Son.—Submont. My-Jc.

2. *C. glaber* (M. E. Jones) Rydb. Biennial or perennial; stem fistulose, 1-1.5 cm. thick, glabrous, 3-5 dm. high; basal leaves lyrate, about 1 dm. long, glabrous; stem-leaves reduced, linear; petals linear, 15 mm. long; pod unknown. *C. crassicaulis glaber* M. E. Jones. Dry hills. s Utah—e Nev. Son. My-Jc.

3. *C. procerus* (Brewer) S. Wats. Perennial or biennial; stems slender, 4-6 dm. high; basal leaves runcinate, glabrous, or the earliest entire, spatulate, stem-leaves narrowly linear to lanceolate; sepals glabrous or nearly so; petals oblong-spatulate, acuminate, with a blunt apex. *C. crassicaulis major* M. E. Jones. Hills and mountain slopes: Calif.—(?) Utah. Son. Jc.

4. *S. pilosus* S. Wats. Biennial; stem 6-12 dm. high, leafy; lower leaves coarsely toothed or pinnatifid, hirsute, 8-20 cm. long; petals slightly longer than the sepals; pod 1.5 mm. wide, widely spreading or recurved. Sandy soil: B.C.—Ida.—Calif. Son.—Submont.

45. STREPTANTHÉLLA Rydb.

Glabrous annual herbs, with entire leaves and branched stems. Flowers perfect in slender racemes. Sepals erect, the outer saccate at the base. Petals crisp and with narrow blades. Stamens distinct; anthers subsagittate at the base. Pod flat, with a long beak. Stigma 2-cleft, with the lobes over the valves. Seeds wing-margined.

1. *S. longirostris* (S. Wats.) Rydb. Stem glabrous, with ascending branches, 2-4 dm. high; basal leaves ovate-spatulate, soon deciduous; stem-leaves linear or linear-oblongate, glabrous; pedicels short, horizontal, or in fruit reflexed, petals oblongate, 4 mm. long; pod pendulous, about 5 cm. long; style 3-5 mm. long. *Arabis longirostris* S. Wats. *Streptanthus longirostris* A. Gray. Sandy soil: Wyo.—N.M.—Ariz.—Wash. Son.—Submont. Ap-Je.

46. CHLOROCRÁMBE Rydb.

Perennial glabrous herbs; stem simple at least up to the inflorescence. Racemes lax, with slender horizontal or reflexed pedicels. Leaves thin, peti-

oled, with usually hastate blades. Sepals greenish, ascending. Petals greenish white, with short claws and lanceolate dentate blades. Anthers sagittate at the base, linear-oblong, at last curved, greenish. Pod slender, somewhat torulose, short-stipitate and short-styled; stigma minute, entire.

1. *C. hastatus* (S. Wats.) Rydb. Perennial; stem glabrous, terete, 6-10 dm. high, simple or branched above; leaves petioled; blades of all except the uppermost leaves hastate, glabrous, thin, 5-12 cm. long; flowers drooping or horizontal; petals 5-6 mm. long; pod terete, 6-9 cm. long; stipe and style about 2 mm. each. *Caulanthus hastatus* S. Wats. Cañons and mountain valleys: Ore.—Utah. *Submont.*—*Mont.* Je-Jl.

47. *SCHOENOCRÁMBE* Greene.

Glabrous perennials or slightly pubescent, with creeping rootstocks. Flowers perfect in elongate racemes. Sepals slightly saccate at the base. Petals light yellow, rather large. Pods sessile, linear-cylindric. Stigmas nearly circular, but 2-lobed. Anthers sagittate at the base. Cotyledons incumbent.

Plant tall, 3-6 dm. high, glabrous.

Leaves all linear, entire

Plant decumbent, slender; pods ascending, more or less arcuate, style about 1 mm. long.

Plant erect, stouter; pods erect or nearly so, straight; style obsolete, 0.5 mm. or less long

Some of the leaves pinnatifid.

Plant low, 1-2 dm. high, pubescent; leaves pinnatifid.

1. *S. decumbens*.

2. *S. linifolia*.

3. *S. pinnata*.

4. *S. pygmaea*.

1. *S. decumbens* Rydb. Perennial; stems slender, decumbent, 2-3 dm. long, as well as the whole plant perfectly glabrous, more or less branched; leaves 2-6 cm. long, 1-3 mm. wide, glaucous; petals yellow, 6-7 mm. long, spatulate or oblanceolate; pods 3-4 cm. long, about 0.75 mm. in diameter. Plains and hills: Mont.—Colo.—Utah. *Plain*—*Submont.* Je—Au.

2. *S. linifolia* (Nutt.) Greene. Stems erect, glabrous, or with a few hairs at the base; leaves glabrous, 4-7 cm. long; petals yellow, spatulate, 8 mm. long; pod erect on ascending pedicels, 3-5 cm. long, 1 mm. thick. *Sisymbrium linifolium* Nutt. Dry plains: Mont.—N M.—Utah—B.C. *Son.*—*Submont.* My—Je.

3. *S. pinnata* Greene. Stems simple, 3-5 dm. high; lower leaves pinnatifid, with oblong to linear divisions, glabrous and glaucous, the upper linear and entire; petals light yellow, 7-10 mm. long; pod 5-6 cm. long, 1 mm. thick, erect on ascending pedicels. Plains and hills: Mont.—Colo.—Utah—Wash. *Son.*—*Submont.* My—Jl.

4. *S. pygmaea* (Nutt.) Greene. Stem low, about 1 dm. high, sparingly pubescent; leaves except the uppermost pinnatifid, with lanceolate or linear divisions; petals yellow, about 6 mm. long, spatulate. Dry soil: Mont.

48. *THELYPODIÓPSIS* Rydb.

Biennials, with rather thick and glaucous foliage and glabrous except the lower part of the stem. Basal leaves spatulate or oblanceolate; stem-leaves auriculate-clasping with rounded auricles. Sepals thin, erect or ascending, not gibbous. Petals more or less clawed, white or purplish or in one species yellow. Anthers long, linear, sagittate at the base, soon spirally curved. Pod slender, terete, more or less torulose, usually with a short stipe and style; stigma 2-lobed, the lobes expanded over the septum; cotyledons obliquely incumbent.

Stipe very short, less than 1 mm. long or almost none; petals white or tinged with purple

Style 2 mm. or nearly so.

Pod 7-9 cm. long

Pod about 4 cm. long.

Style less than 1 mm. long; pod 5-7 cm. long.

Stipe 2-5 mm. long; petals and sepals yellow.

1. *T. elegans*.

2. *T. Bakeri*.

3. *T. wyomingensis*.

4. *T. aurea*

1. *T. elegans* (M. E. Jones) Rydb. Stem 6-15 dm. high, erect, simple or branched, glabrous or slightly hairy below; basal leaves oblanceolate or spatulate, dentate, 2-4 cm. long; stem-leaves ovate or lanceolate; petals 8-10 mm. long,

1 mm. wide. *Thelypodium elegans* M. E. Jones. Sandy soil and adobe plains: Colo.—Utah. *Submont.* My-Je.

2. *T. Bakeri* (Greene) Rydb. Stems several, branched, 2-4 dm. high, sparingly hairy at the base; basal leaves petioled, oblanceolate, denticulate, 2-4 cm. long; stem-leaves 1-2 cm. long, glabrous and glaucous, ovate; petals white, 6-8 mm. long; pod about 1.5 mm. thick, torulose. *Thelypodium Bakeri* Greene. Valleys: Colo. *Submont.* My-Je.

3. *T. wyomingensis* (A. Nels.) Rydb. Stem single or several, branched, 2-5 dm. high, glabrous or nearly so; basal leaves obovate or oblanceolate, toothed, 2-5 cm. long; cauline leaves glaucous, ovate or oblong, 4-7 cm. long, petals white, sometimes pinkish, 10-12 mm. long; pod nearly sessile, 1.5 mm. wide. *Streptanthus wyomingensis* A. Nels. Dry desert regions: Wyo.—Utah—Colo. *Son.*—*Submont.* Je.

4. *T. aurea* (Eastw.) Rydb. Stem 3-10 dm. high, branching, sparingly retrorse-hairy at the base; basal leaves oblanceolate, dentate, with margined petioles; cauline leaves ovate, entire, glaucous; sepals and petals yellow; petals about 8 mm. long; pod 4-7 cm. long, somewhat over 1 mm. wide. *Thelypodium aureum* Eastw. Arid regions: Colo. *Submont.* Je.

49. *HETERÓTHRIX* (B. L. Robins.) Rydb.

Slender biennials, more or less pubescent, at least below, with stellate or branched hairs. Basal leaves oblanceolate, more or less toothed; stem-leaves lance-linear or linear, entire. Racemes elongate, slender. Calyx more or less oblique, the lower sepals being longer than the upper, all ascending, rather firm and more or less purplish. Petals oblanceolate or spatulate, indistinctly or broadly clawed. Filaments subulate; anthers linear, sagittate at the base, spirally curved. Pod slender, terete, sessile; stigma minute, entire or slightly lobed, the lobes expanding over the septum; cotyledons obliquely incumbent. [*Thelypodium* § *Heterothrix* B. L. Robins.]

1. *H. micrantha* (A. Gray) Rydb. Stems branched, 3-6 dm. high; basal leaves 2-5 cm. long; upper stem-leaves linear, often glabrate, raceme elongate, narrow; petals 3-4 mm. long, cuncate-spatulate; pedicels and pods erect, the latter 3-4 cm. long, less than 1 mm. thick. *Thelypodium micranthum* A. Gray. Mountains: Colo.—Tex.—Ariz.; Mex. *Son.*—*Submont.* Jl-O.

50. *HESPERIDÁNTHUS* (B. L. Robins.) Rydb.

Erect, slender, glabrous perennials, with pale foliage, corymbosely branched above. Basal leaves obovate, toothed; stem-leaves linear, entire. Sepals rather firm, erect, the outer strongly saccate at the base. Petals purple, with obovate blades. Anthers linear, sagittate at the base, strongly curved. Stigma conical or ovate, neither truncate nor 2-lobed. Pod terete, linear, short-stipitate [*Thelypodium* § *Hesperidanthus* B. L. Robins.]

1. *H. linearifolium* (A. Gray) Rydb. Stem erect, 6-15 dm. high; basal leaves 5-10 cm. long, oblanceolate or spatulate, thick, pale; stem-leaves sessile, linear, entire; petals purplish, 12-15 mm. long; pedicels in fruit 1-2 cm. long; pod 5-10 cm. long, 1.5 mm. wide. *Streptanthus linearifolius* A. Gray. *Thelypodium linearifolium* A. Gray. Dry hills and plains: Colo.—Tex.—Ariz.; Mex. *Submont.*—*Mont.* F-Je.

51. *THELYPÓDIUM* Endl.

Perennial, biennial, or annual leafy-stemmed plants. Flowers perfect, in elongate racemes. Sepals oblong to linear, erect, scarcely gibbous at the base. Petals white or purplish, with a well-developed blade, clawed. Stamens with long, slender, exerted filaments; anthers linear, sagittate at the base, curved and twisted. Pods slender, linear, more or less distinctly stipitate, terete; stigma entire or nearly so, truncate. Cotyledons incumbent.

Upper leaf-blades auriculate at the base.

Pods 3-5 cm. long.

Petals 6-9 mm. long, about twice as long as the sepals.

Pods 2-3 cm. long; basal leaves oblanceolate or spatulate.

Petals 5-6 mm. long, blades spatulate; pedicels nearly erect.

Petals 7-9 mm. long, blades obovate, pedicels spreading or ascending.

Pods 1-2 cm. long; basal leaves oval

Petals 10-15 mm. long, about three times as long as the sepals.

Pods 4-5 cm. long, 1 mm. wide.

Pods about 3 cm. long, nearly 2 mm. wide

Pods 5-10 cm. long, arcuate, spreading or ascending.

Stem stout, lower leaves coarsely sinuate-dentate; petals obovate, more than 2 mm. wide

Stem slender, lower leaves entire or slightly sinuate; petals narrowly spatulate, barely 2 mm. broad.

Upper leaf-blades attenuate at the base, leaves mostly laciniate.

Petals narrowly linear-ob lanceolate.

Pods divergent, raceme lax.

Pods erect, raceme dense

Petals spatulate, pods reflexed; raceme lax.

1. *T. Palmeri*.

2. *T. sagittatum*.

3. *T. ovalifolium*.

4. *T. macropetalum*.

5. *T. Nuttallii*.

6. *T. ambiguum*.

7. *T. eucosmum*.

8. *T. leptosepalum*.

9. *T. milleflorum*.

10. *T. utahense*.

1. *T. Palmeri* Rydb. Biennial, with a taproot; stem 3-5 dm. high, sparingly hirsute below, glabrous above, basal leaves 2-4 cm. long, more or less hirsute beneath, especially on the veins; stem-leaves sagittate, 2-4 cm. long, glabrous or nearly so; inflorescence usually branched; petals white or rose; pod about 2-5 cm. long, 1 mm. wide. Arid regions: s Utah. Son.

2. *T. sagittatum* (Nutt.) Endl. Biennial; stem 3-6 dm. high, branched above, glabrous or nearly so; basal leaves oblanceolate, 2-6 cm. long, glabrous or sparingly hirsute; stem-leaves sagittate, 2-6 cm. long, glabrous; petals white or purplish; pods 1 mm. wide, nearly erect, somewhat torulose. *T. paniculatum* A. Nels. *T. torulosum* Heller. Sage plains and alkali soil: Mont.—Colo.—Utah—Ida. Son.—Submont. Je—Au.

3. *T. ovalifolium* Rydb. Biennial or perennial, perfectly glabrous; stems terete, 3-5 dm. high, earliest basal leaves about 5 cm. long, petioled, with broadly oval blades, the later ones oblanceolate, stem-leaves sagittate, 2 cm. long, thick; petals about 5 mm. long, with spatulate blades; pedicels in fruit 4-5 mm. long, spreading; pods ascending, about 1 mm. wide, somewhat torulose. Plains: Utah. Son. Au—S.

4. *T. macropetalum* Rydb. A glabrous perennial, 4-6 dm. high; basal leaves oblanceolate or spatulate, 2-5 cm. long; lower stem-leaves oblong, obtuse, sessile, 5-6 cm. long; upper leaves lanceolate-sagittate, acute; pedicels divaricate; petals purple, spatulate; pods 1 mm. wide, ascending or erect and somewhat incurved. Hills and plains: Utah—Ida. Submont. My—Je.

5. *T. Nuttallii* S. Wats. Biennial, glabrous and glaucous; stem 4-10 dm. high; basal leaves 5-15 cm. long, lanceolate; stem-leaves sagittate, 2-10 cm. long; petals lilac or whitish, 10-15 mm. long, pod nearly 2 mm. thick; style 1 mm. long. *Streptanthus sagittatus* Nutt. *T. sagittatum* Heller, not Endl. Plains and valleys: Wyo.—Utah—Ore.—Wash. Son. Je—Au.

6. *T. ambiguum* S. Wats. Stout biennial, glabrous; stem 6-15 dm. high; radical leaves thick, coarsely toothed, 1-2 dm. long, oblanceolate; stem-leaves 1-5 cm. long, subentire; petals purplish, about 1 cm. long; blade obovate; pod 2 mm. thick; style very short. Arid regions: s Utah—Ariz. Son.

7. *T. eucosmum* B. L. Robins. Glabrous biennial or perennial (?); lower leaves oblong, entire or slightly sinuate, the upper lanceolate, clasping, 3-7 cm. long; racemes several, many-flowered; pedicels 4-6 mm. long, spreading; petals deep purple, 8 mm. long; pod arcuate, ascending. Mountains: Ore.—Ida. My—Je.

8. *T. leptosepalum* Rydb. Annual or biennial, glabrous throughout; stem 4-6 dm. high, branched; leaves thin, glabrous, 6-10 cm. long, lyrate-pinnatifid, with lanceolate divergent lobes; petals with scarcely any distinction between blade and claw, 8 mm. long, 0.5 mm. wide or less. Rocky banks: Ida. Son.

9. *T. milleflorum* A. Nels. Glabrous biennial, 1-2 m. high; leaves coarsely and irregularly dentate to entire, oblong or lanceolate below to linear above; inflorescence often 4-6 dm. long; flowers numerous, crowded; petals white, twice

as long as the sepals; pods filiform, 6–10 cm. long, erect or nearly so; stipe and style each 2–3 mm. long. Rich slopes: Ida.—Wash.—Ore.—Nev. *Son.* My-Je.

10. *T. utahense* Rydb. Annual or biennial; stem 4–6 dm. high, sparingly pubescent below; leaves all lanceolate in outline, 5–10 cm. long, lanceolate, glabrous; segments oblong-lanceolate to triangular; pedicels very short, in fruit scarcely more than 1 mm. long; petals spatulate, 4 mm. long, white; pod about 3 cm. long. Arid regions: s Utah. *L. Son.* Ap.

52. *PLEUOPHRAGMA* Rydb.

Tall glabrous perennials or biennials, with paniculate inflorescence and thick entire leaves. Basal leaves oblanceolate or spatulate; stem-leaves linear-lanceolate, sessile, but not clasping. Sepals ascending, thin, more or less petaloid. Petals white or purplish, with slender claws. Filaments subulate, white, with conspicuous glands at their bases; anthers linear, sagittate at the base, curved. Receptacle dilated. Pod slender, terete, torulose; stipe short; style short, slender; stigma minute, entire; septum with a strong midrib.

Pedicels not flattened, about 1 cm. long.

Stipe 0.5–1 mm. long, inflorescence short

Stipe 2–3 mm. long; inflorescence elongate

Pedicels flattened at the base, about 3 mm. long; stipe 1–2 mm. long

1. *P. integrifolium*

2. *P. gracilipes*.

3. *P. platypodium*

1. *P. integrifolium* (Nutt.) Rydb. Perennial, with a taproot; stem simple, strict or branched above, 6–20 dm. high; basal leaves 5–30 cm. long; stem-leaves 4–10 cm. long; inflorescence paniculate, at first corymbiform; pedicels in fruit spreading; petals 6–7 mm. long; pod 2.5–3 cm. long, 1–1.5 mm. thick. *Thelypodium integrifolium* Endl. ? *T. lilacinum* Greene. Dry plains: Neb.—N.M.—Calif.—Wash. *Plain*—*Submont* Jl—Au.

2. *P. gracilipes* (Robins.) Rydb. Perennial, resembling the preceding, but more slender, about 5 dm. high; inflorescence more elongate; flowers smaller; pod more slender, less than 1 mm. thick, and with longer stipe. *Thelypodium integrifolium gracilipes* Robins. Wet ground: Colo.—N.M. *Son.*

3. *P. platypodium* Rydb. Glabrous perennial, with a taproot; stem simple up to the inflorescence, 1–2 m. high; basal leaves 5–10 cm. long, entire; stem-leaves 3–6 cm. long; inflorescence paniculate; racemes dense, at first corymbiform, in fruit about 1 dm. long; petals white, 6–7 mm. long; pod 1.5–2 cm. long, 1–1.5 mm. thick, torulose. Arid regions: Utah—Ariz. *Son.*

53. *STANLEYELLA* Rydb.

Tall branched biennials. Leaves thin, the lower ones lyrate-pinnatifid, the upper entire. Sepals thin, petaloid, white, oblong or linear, spreading or even reflexed in anthesis. Petals white, with oblanceolate or spatulate blades gradually tapering into a short claw. Filaments distinct, filiform; anthers linear, sagittate at the base, soon more or less spirally recurved. Pod slender, terete with short stipe and short style; stigma small, truncate or nearly so. Cotyledons incumbent and somewhat conduplicate.

1. *S. Wrightii* (A. Gray) Rydb. Biennial; stem 6–15 dm. high, much branched, sparingly hairy below; basal leaves 1–1.5 dm. long, lyrate-pinnatifid, with lanceolate or elongate, triangular toothed lobes; stem-leaves less lobed or the upper entire, linear-lanceolate; petals white, 6 mm. long; pedicels in fruit divergent, 10–15 mm. long; pod 5–7 cm. long, less than 1 mm. thick. *Thelypodium Wrightii* A. Gray. River bottoms: Colo.—N.M.—Ariz.—Utah. *Son*—*Submont.* Je—Au.

54. *STANLEYA* Nutt. PRINCE'S PLUME.

Leafy perennials, usually more or less glaucous. Flowers perfect in elongate, many-flowered racemes. Sepals oblong, widely spreading in anthesis. Petals with long claw and narrow elongate blades. Stamens 6; filaments elongate,

spreading; anthers linear, curved and spirally coiled. Pods long-stipitate, elongate-linear, terete; valves 1-nerved. Stigma sessile, small, simple. Seeds in one row, oblong; cotyledons incumbent.

Middle cauline leaves sessile by an auriculate base.

Stem winged; petals greenish

Stem not winged, petals yellow.

Middle cauline leaves petioled or sessile with a narrowed base.

Plant white-villous.

Plant not white-villous

Blades of the petals linear-oblong to elliptic, bright yellow.

Blades of the petals one-third to two-thirds as long as the claws.

Pod arcuate, not tortuose

Leaves sparingly hirsute

Filaments hairy, lower leaves pinnatifid, with lanceolate or oblong lobes.

Filaments glabrous, lower leaves runcinate, with triangular lobes.

Leaves glabrous.

Pod decidedly tortuose

Blades of the petals as long as the claws.

Leaves glabrous

Leaves broadly lanceolate, the lower with short broad lobes; blades of the petals oblong; pod ascending

Leaves linear-lanceolate, usually all entire; blades of the petals broadly elliptic, pod recurved

Leaves finely puberulent

Blades of the petals rounded-oval, ochroleucous.

1. *S. viridiflora*.

2. *S. confertiflora*.

3. *S. tomentosa*.

4. *S. pinnata*.

5. *S. runcinata*.

6. *S. glauca*.

7. *S. bipinnata*.

8. *S. integrifolia*.

9. *S. arcuata*.

10. *S. canescens*.

11. *S. albescent*.

1. *S. viridiflora* Nutt. Stem glabrous, 3-10 dm. high; basal and lower cauline leaves glabrous or short-pubescent, 7-20 cm. long, oblanceolate or spatulate; petals 12-15 mm. long; claws subulate, about as broad as the linear blades; filaments glabrous; stipe 5-8 mm. long; pod spreading, somewhat arcuate and torulose, 4-5 cm. long. *S. heterophylla* Nutt. Bare hills: Wyo.—Mont.—Ore.—Nev. *Submont.* My-Jl.

2. *S. confertiflora* (B. L. Robins.) Howell. Stem glabrous, terete, 4-6 dm. high; basal leaves glabrous, 4-6 cm. long, oblanceolate; petals yellow, about 12 mm. long; claw about equalling the linear blades; pods 4-5 cm. long, ascending, not torulose; stipe about 6 mm. long. Foot-hills: Ida.—Ore. *Submont.* Ap-My.

3. *S. tomentosa* Parry. Stem terete, woolly below, 8-15 dm. high, angled above; lower leaves lyrate pinnatifid; terminal segment lanceolate, 3-7 cm. long; lateral segments ovate-oblong; petals cream-colored; pedicels of the pod equalling the stipe. Dry slopes: Wyo. *Submont.*

4. *S. pinnata* (Pursh) Britton. Stem sparingly hairy or glabrate, 3-10 dm. high, terete; leaves thick, commonly pinnatifid, with oblong or lanceolate divisions, or the upper entire, more or less pubescent; petals 10-15 mm. long; pod 6-7 cm. long, spreading; stipe 10-15 mm. long, twice as long as the pedicels. *S. pinnatifida* Nutt. Plains: S.D.—Neb.—Utah. *Plain.* My-Au.

5. *S. runcinata* Rydb. Stem stout, glabrous; basal leaves about 2 dm. long, lanceolate in outline, runcinately divided, softly pubescent, with long white hairs, lobes broadly triangular or the lowest ones oblong; stem-leaves ovate to oblanceolate, more glabrous; pods almost erect and straight, 6-7 cm. long, 1.5 mm. wide, on spreading pedicels about 1 cm. long. (?) *S. rara* A. Nels. Plains: Ida. *Son.*

6. *S. bipinnata* Greene. Stem flexuose, 2-6 dm. high, terete, glabrous; leaves except the uppermost pinnatifid, with oblong or linear, often lobed divisions; petals yellow, 8-10 mm. long; pod 4-5 cm. long, torulose and tortuose; stipe 7-8 mm. long, about equalling the pedicels. Plains and dry draws: Wyo.—Colo.—Kans. *Plain.* Jl-Au.

7. *S. glauca* Rydb. Stem 4-6 dm. high, bluish green; lower leaves 1-1.5 dm. long, more or less pinnatifid, with linear-lanceolate or oblong lobes, the terminal usually much longer than the rest; upper leaves usually entire, linear-lanceolate; petals lemon-yellow, about 1 cm. long; claws pubescent; pedicels about 1 cm. long, more or less spreading; stipes about 1.5 cm. long; pod proper about 5 cm. long and 1.5 mm. thick, somewhat arcuate. Dry hills and tablelands: Colo.—N.D.—Wyo. *Plain—Submont.*

8. *S. integrifolia* James. Stem glabrous, 3-6 dm. high; leaves 5-10 cm. long, thick, glabrous, the upper entire, the lower with triangular to oblong lobes; petals sulphur yellow, about 12 mm long; pod 5-6 cm. long; stipe 12-15 mm. long, about equalling the pedicels. Dry plains and hills: S.D.—Kans.—Colo.—Wyo. *Plain—Submont.* Je—Jl.

9. *S. arcuata* Rydb. Stem 4-10 dm. high, perfectly glabrous, light green and shining, in age straw-colored; leaves thick, 5-12 cm. long; pedicels rather short, in fruit about 1 cm. long; petals yellow, 7-8 mm. long, broadly elliptic; pods 7-10 cm. long, strongly arcuate, and spreading. Dry plains and valleys: Wyo.—N.M.—Calif.—Nev. *Son.* Je—Jl.

10. *S. canescens* Rydb. Stem 0.5-1 m. high, light green, finely puberulent or glabrate, terete; leaves grayish puberulent, the upper entire and oblanceolate, 5-7 cm long, the lower pinnatifid, with oblong lateral lobes and a large oval or elliptic end-lobe; pedicels short, in fruit divergent, blades of the yellow petals linear-oblong, about as long as the claw; pods arcuate, spreading, 5-7 cm. long. Dry ground: Utah—Ariz. *Son.—Submont.* Je.

11. *S. albescent* M. E. Jones. Stem 3-10 dm. high; lower leaves 10-15 cm long, lyrate-pinnatifid, with oblong or elliptic lobes, the upper hastate at the base; petals fully 1 cm. long; blades broadly oval, about equalling the pubescent claws; pod about 5 cm. long; stipe somewhat longer than the pedicels. Draws and river banks: Colo.—Utah—Ariz.—N.M. *Son.* Ap—Je.

FAMILY 53. CAPPARIDACEAE. CAPER FAMILY.

Herbs with alternate, digitately compound or rarely simple leaves. Flowers perfect, regular or irregular, usually in racemes. Sepals 4, distinct or united at the base. Petals 4, rarely more, clawed. Receptacle often thickened or produced between the stamens and the petals. Stamens 6 or more. Gynocium of 2 united carpels, 1-celled, with 2 parietal placentae, sessile or stalked. Fruit in ours dehiscent, the valves separating from the frame-like placentae (replum).

Pods elongate, linear; receptacle with an appendage or gland.

Appendages tubular; petals cuneate-flabelliform, lacinate, very unequal.

Appendages solid; petals entire, emarginate or 3-toothed, but not lacinate.

Stamens 12-32; capsule sessile or short-stipitate.

Stamens 6, capsule long-stipitate

Pods short; receptacle without appendages

Pod oblong, flattened parallelly to the replum.

Pod broader than long, more or less flattened contrary to the replum.

1 CRISTATELLA.

2 JACKSONIA.

3 PERITOMA.

4 CELOME.

5 CLEOMELLA.

1. CRISTATELLA Nutt.

Slender glandular annuals. Leaves alternate, without stipules, palmately trifoliolate, with narrow entire leaflets. Flowers perfect, small, white or yellowish, in terminal racemes. Sepals 4, united at the base, deciduous. Receptacle produced between the posterior petals and the ovary into a tubular appendage, as long as the smaller petals. Petals 4, more or less fan-shaped, clawed, lacinate at the apex, the posterior larger. Stamens 6-14, declined; filaments filiform, distinct; anthers sagittate. Capsule elongate, flattened. Seeds numerous.

1. *C. Jamesii* T. & G. Erect annual; stem 1-4 dm. high, glandular-puberulent, branched above; leaflets 3, linear or linear-oblong, 8-25 mm. long; petals cream-colored, 3-4 mm. long; stipe about 4 mm. long; body of the capsule about 2 cm. long and 4 mm. wide, glandular, oblanceolate or oblong. Sandy soil: Ia.—Ark.—Colo. *Plain.* Je—Au.

2. JACKSONIA Raf. CLAMMY-WEED.

Glandular, clammy annuals. Leaves alternate, without stipules, palmately trifoliolate or sometimes simple. Flowers perfect, somewhat irregular, in ter-

minial racemes. Receptacle inconspicuous, with a solid gland on the upper side. Sepals 4, imbricate, deciduous. Petals 4, imbricate, entire or notched at the apex, with slender claws. Stamens 12-32; filaments purple, more or less declined; anthers introrse. Capsule elongate, flattened, sessile, 2-valved at the apex. Seeds numerous. [*Polanisia* Raf.]

1. **J. trachysperma** (T. & G.) Greene. Stem 3-8 dm. high, usually branched; leaflets 3, oblanceolate, elliptic or oval, 2-5 cm. long; petals long-clawed, 8-12 mm. long; stamens about 16; filaments purple; pods sessile, linear, 4-5 cm. long, 6-7 mm. wide. *P. trachysperma* T. & G. Sandy soil and cañons: Sask.—Ia.—Tex.—Ariz.—B.C. Plain—Submont. Je—Au.

3. PERITOMA DC. BEE FLOWER, INDIAN PINK, STINK FLOWER.

Tall glabrous or pubescent annuals. Leaves palmately trifoliate, petioled, alternate. Flowers perfect, in terminal racemes, nearly regular. Sepals 4, united below, valvate; calyx deciduous by circumscission at base. Receptacle with a solid appendage opposite the upper sepal. Petals 4, nearly equal, convolute, scarcely clawed. Stamens 6; filaments filiform, unequal, more or less declined; anthers spirally coiled. Capsule elongate, stalked, 1-celled, 2-valved. Seeds numerous, pendulous, conduplicate. [*Cleome* L., in part.]

Petals yellow

Petals purple, pink, or white.

Petals 8-12 mm. long, usually 3-toothed.

Stamens exserted.

Pods 2.5-5 cm. long, broadly linear, calyx-lobes lanceolate to ovate, longer than broad.

Pods 6-7 cm. long, narrowly linear, calyx-lobes broadly triangular, abruptly acuminate, broader than long

Stamens included.

Petals about 4 mm. long, entire.

1. *P. luteum*.

2. *P. serrulatum*.

3. *P. angustum*.

4. *P. inornatum*.

5. *P. Sonorae*.

1. **P. luteum** (Hook.) Raf. Stem 3-6 dm. high; leaflets 3-7, linear-ob lanceolate to oblong, entire, 3-5 cm. long; petals yellow, oblanceolate, 6-8 mm. long; pedicels about 1 cm. long, spreading; stipe 1-2 cm. long; body of the pod 1-5 cm. long. *Cleome lutea* Hook. River bottoms and banks: Neb.—N.M.—Ariz.—Ore—Wash. Plain—Submont. My—Au.

2. **P. serrulatum** (Pursh) DC. Stem 6-15 dm. high; leaves 3-foliate; leaflets lanceolate to obovate-oblong, entire or rarely denticulate, 3-10 cm. long, minutely pubescent or glabrous, petals fully 1 cm. long, purplish, rose-colored, or white; stipe of the pod 1.5-2 cm. long; body 2.5-5 cm. long, 4-6 mm. thick. *Cleome serrulata* Pursh. *C. integrifolia* T. & G. Prairies, sand-draws, and waste places: Sask.—Kans.—N.M.—Ariz.—Ore. Plain—Mont. My—Au.

3. **P. angustum** (M. E. Jones) Rydb. Stem 5-10 dm. high; leaflets 3, lanceolate, entire, 5-10 cm. long, glabrous; petals 8-10 mm. long, rose-colored or white; stipe of the fruit 1.5-2 cm. long; body 6-7 cm. long, about 4 mm. thick, tapering gradually at each end. *Cleome integrifolia angusta* M. E. Jones. Valleys: Utah—Ariz.—N.M. Son. Je—Jl.

4. **P. inornatum** Greene. Stem 3-6 dm. high, branched; leaflets 3, broadly lanceolate, acute, entire, 2-3 cm. long, glabrous above, sparingly pubescent beneath; calyx-teeth broadly triangular, cuspidate; petals 7-8 mm. long, white or faintly purplish. Dry valleys: Colo. Submont. Au.

5. **P. Sonorae** (A. Gray) Rydb. Stem 3-6 dm. high, often simple, glabrous; leaflets 3, linear, 1-2 cm. long, glabrous; petals white or purplish; stamens of about the same length; stipe somewhat reflexed, 6-8 mm. long; body of the pod 10-15 mm. long, 2.5 mm. thick, acute at both ends. Dry plains and saline soil: N.M.—Colo.—Sonora. Son. Jl.

4. CELÔME Greene.

Hirsute annuals. Leaves petioled, digitately trifoliate, alternate. Flowers regular, perfect, in bracted terminal racemes. Receptacle glandless. Sepals 4, distinct, deciduous, linear. Petals 4, spatulate, not clawed. Stamens 6; filaments filiform, distinct; anthers spirally coiled. Pod long-stipitate, broad, flat, with the seeds distinctly in two rows.

1. *C. platycarpa* (Torr.) Greenc. Stem 3-5 dm. high; leaflets 3, oval or oblong, petiolulate, 1.5-4 cm. long; bracts unifoliate, petioled, elliptic; sepals linear-subulate; petals golden yellow, 6-7 mm. long; stipe of the fruit 10-15 mm. long; body elliptic, 12-15 mm. long, 6-7 mm. wide, pubescent; style slender, 3 mm. long. *Cleome platycarpa* Torr. Alkaline and lava soil: Ore.—Ida.—Nev.—n Calif. Son. My-Je.

5. CLEOMELLA DC.

Glabrous annuals. Leaves alternate, without stipules, digitately trifoliate, petioled. Flowers small, yellow, in terminal bracted racemes, nearly regular. Receptacle elongate, without appendage. Sepals 4, distinct, thin, imbricate, deciduous. Petals 4, entire, sessile, deciduous. Stamens 6; filaments filiform, equal, distinct. Capsule short, broader than long, inflated, with two helmet-like valves. Seeds usually 2 on each placenta, pendulous.

Stipe longer than the pod; leaflets linear to oblong.

Seeds rugose or tessellate, leaflets linear; pod rhombic.

Petals 3-5 mm. long; pod about 6 mm. wide, seed transversely rugose.

Petals 2-3 mm. long; pod 3-4 mm. wide; seed tessellate.

Seeds smooth and unmarked.

Pod broadly rhombic; leaflets oblong or oblanceolate.

Stem 2-3 dm. high; pod with sharp angles

Stem less than 1 dm. high; pod with rounded angles.

Pod ovate; leaflets linear.

Stipe shorter than the pod, leaflets oval or broadly oblong.

1. *C. angustifolia*.

2. *C. plocosperma*.

3. *C. cornuta*.

4. *C. nana*.

5. *C. oocarpa*.

6. *C. Palmerana*.

1. *C. angustifolia* Torr. Stem glabrous, branched, 3-6 dm. high; leaflets acuminate or acute, 3-4 cm. long; sepals lanceolate, 1 mm. long; petals yellow, 5 mm. long, oblanceolate; pedicels ascending, 10-15 mm. long; stipes spreading, 5-6 mm. long; body of the pod rhombic, about 5 mm. long, 6 mm. broad, with rounded angles. River valleys and plains: Neb.—Tex.—Utah. Plain—Son. Jl-S.

2. *C. plocosperma* S. Wats. Stem 3-5 dm. high, diffusely branched; leaflets 3, linear, 1-2 cm. long; sepals ovate, 0.5 mm. long; petals yellow, 4 mm. long, pedicels divaricate, 6-8 mm. long; stipe 3-5 mm. long; body of the pod rhombic, 3-4 mm. long and as wide. Desert regions: Utah—Nev. Son. Jl-S.

3. *C. cornuta* Rydb. Stem 2-3 dm. high, branched below, glabrous; leaflets 1-2 cm. long, oblong or oblong-oblanceolate, obtuse, mucronate; sepals ovate, cuspidate; petals light yellow, narrowly oval, clawless, about 3 mm. long, pedicels very slender, almost 1 cm. long; pod broadly rhombic, about 3 mm. long and 4 mm. broad, the corners often produced into short processes; stipe 6-8 mm. long. Dry places: Utah. Son. Jl.

4. *C. nana* Eastw. Stems 3-8 cm. high, simple or branched from the base; leaflets 6-10 mm. long, entire; pedicels 5-10 mm. long; sepals subulate-aristate; petals yellow, oval, 4-5 mm. long, obtuse; stipe deflexed, 6 mm. long; pod rhombic, 4 mm. long, 5 mm. wide. Dry regions: Utah. Son. My.

5. *C. oocarpa* A. Gray. Stem diffusely branched, 2-3 dm. high; leaflets linear, obtuse, 1-3 cm. long; petals yellow, 6 mm. long; pedicels 6 mm. long; stipe about 6 mm. long; pod ovate, 4 mm. long and about as wide. Arid regions: Colo.—Nev. Son.

6. *C. Palmerana* M. E. Jones. Stem 5-25 cm. high, branched from the base; leaflets obtuse, 1-2 cm. long; pedicels 6-8 mm. long, reflexed; petals orange, 4 mm. long, oblong-oblanceolate; stipe 2 mm. long; pod 4-5 mm. long, 8-10 mm. wide; seeds smooth, spotted. (?) *C. Montrosae* Payson. Dry regions: Utah—Colo. Son. My.

FAMILY 54. DROSERACEAE. SUNDEW FAMILY.

Mostly subcaulescent herbs, with glandular-viscid leaves, which are either filiform and circinate in the bud or with broadened sensitive blades. Flowers perfect, regular, racemose or spicate. Sepals 4-8, imbricate.

Petals as many, convolute. Stamens 5-8, mostly 5. Gynoecium of 2-5 united carpels; ovary 1-celled, with 2-5 parietal placentae, rarely 2-3-celled, loculicidally 2-5-valved.

1. *DRÓSERA* L. SUNDEW.

Perennials, in ours scapose, with basal leaves. Sepals, petals, and stamens 4-8. Petals white or pink, spatulate or oblanceolate. Filaments subulate or filiform; anthers extrorse. Ovary 1-celled, superior; styles 2-5, distinct. Capsule 2-5-valved.

Leaf-blades suborbicular or broader than long.

1. *D. rotundifolia*.

Leaf-blades elongate.

Leaf-blades spatulate or oblanceolate; seeds smooth.

2. *D. longifolia*.

Leaf-blades linear or linear-oblanceolate, seeds muricate.

3. *D. linearis*.

1. *D. rotundifolia* L. Rosulate perennial; leaf-blades 6-10 mm. wide; scape glabrous, 1-3 dm. high; raceme secund; calyx about 3 mm. long; lobes ovate-oblong; petals about 4 mm. long, white; capsule erect, about 5 mm. long; seeds smooth. Sphagnum bogs: Lab.—N.J.—Ida.—Calif.—Alaska; Eurasia. *Boreal*—*Mont.* Je-S.

2. *D. longifolia* L. Rosulate perennial; leaf-blades spatulate or oblanceolate, 1.5-3 cm. long, about 4-5 mm. wide; scape 1-3 dm. high; calyx about 4 mm. long; lobes oblong; petals white, 5 mm. long; pods 7-8 mm. long. *D. anglica* Huds. Bogs: Newf.—Ont.—Ida.—Calif.—B.C.; Eurasia. *Boreal*—*Mont.* My-Au.

3. *D. linearis* Goldie. Rosulate perennial; leaf-blades linear or narrowly linear-oblanceolate, 1.5-4 cm. long, 2-3 mm. wide; scape 3-10 cm. high, 1-4 flowered; calyx 3-4 mm. long, lobes ovate; petals white, 5-6 mm. long; capsule 5-6 mm. long. Bogs: Que.—Mich.—Alta. *Boreal.* Jl-Au.

FAMILY 55. *CRASSULACEAE*. STONE-CROP FAMILY.

Herbs or rarely shrubby plants, mostly fleshy or succulent, without stipules. Flowers mostly cymose, perfect, regular. Calyx persistent; sepals 4 or 5, usually free, rarely united. Petals 4 or 5, free or more or less united, rarely wanting. Stamens as many or twice as many as the petals. Pistils as many as the sepals, distinct or united at the base. Fruit of follicles, dehiscent on their ventral suture.

Stamens twice as many as the sepals.

Flowers axillary, arranged in elongate racemes or spikes; petals rose-colored, distinct.

1. *CLEMENTSIA*.

Flowers terminal, in cymes or one-side racemes.

Petals more or less united, erect; corolla tubular.

2. *GORMANIA*.

Petals distinct

Flowers polygamous or dioecious, carpels erect; petals in ours purplish.

3. *RHODIOLA*.

Flowers perfect, carpels spreading; petals in ours yellow.

4. *SEDUM*.

Stamens as many as the sepals, minute annual mud or water plants.

5. *TILLAEASTRUM*.

1. *CLEMENTSIA* Rose. RED ORPINE.

Perennial herbs, with elongate rootstocks. Stem-leaves numerous. Flowers in dense spikes or racemes. Sepals distinct, linear or linear-lanceolate. Petals distinct, rose-colored. Stamens 10, the 5 opposite to the petals adnate to them up to the middle. Carpels 5, erect.

1. *C. rhodantha* (A. Gray) Rose. Stems several from the thick rootstock, simple, 1.5-3.5 dm. high; leaves linear-oblong or oblanceolate, sessile, 1.5-3 cm. long, entire or few-toothed; raceme very dense, 2-6 cm. long; petals linear-lanceolate, twice as long as the sepals. *Sedum rhodanthum* A. Gray. Mountain meadows: Mont.—N.M.—Ariz. *Mont.*—*Alp.* Je-Au.

2. *GORMÁNIA* Britton.

Perennial herbs, with horizontal rootstocks. Leaves spatulate, obovate, or orbicular, the basal ones numerous, the cauline ones similar but smaller. Flow-

ers perfect, cymose or thyrsoid. Sepals distinct or nearly so. Petals 5, united below the middle, yellow or red, acute or acuminate. Stamens 10, adnate to the corolla; anthers mostly oblong. Carpels 5, united below, erect or nearly so, many-seeded.

1. *G. debilis* (S. Wats.) Britton. Perennial, with a slender rootstock; stems often decumbent at the base, 3–12 cm. high; leaves ovate-orbicular, or the upper ones oblong, obtuse, sessile; cyme 2–5 cm. broad; corolla yellow; lobes lanceolate, 6–8 mm. long. *Sedum debile* S. Wats. Rocky ridges: Utah—Nev.—Ore.—Ida. *Submont.*—*Mont.* Je—Au.

3. RHODIOLA L. ROSE-ROOT, ROSE-WORT.

Perennial, with a thick, red, somewhat branching rootstock. Flowers polygamous or dioecious, 4- or 5-merous. Leaves broad and soft, not very thick. Sepals distinct, oblong or lanceolate. Petals rather narrow, distinct, yellowish or greenish, or in our species purplish. Carpels erect, only the beaks spreading.

Petals acute; follicles 3–5 mm. long, the beak 0.5 mm. long, divergent or recurved, dioecious.

Petals abruptly acuminate; follicles 6–8 mm. long; the beak 1 mm. long, ascending, polygamo-dioecious.

1. *R. integrifolia* Raf. Stems usually less than 1 dm. high; leaves flat, 1–1.5 cm. long, obovate or oblong-obovate, often dentate above the middle; sepals lanceolate, acute, 1.5–2 mm. long, dark purple or rarely greenish; petals oblanceolate or oblong, acute, about 3 mm. long, usually dark purple. *Sedum Rhodiola* Coult. *S. frigidum* Rydb. Alpine-arctic situations, among rocks: Alta—Colo.—Calif.—Alaska. *Alp*—*Subalp.* Je—Au.

2. *R. polygama* (Rydb.) Britt. & Rose. Stem 1–3 dm high; leaves obovate or oblanceolate, acute, sessile, flat, entire or minutely denticulate, 1.5–2.5 cm long; sepals lanceolate, 2 mm. long, acute; petals oblanceolate, dark purple, about 3 mm. long. *Sedum polygamum* Rydb. Alpine peaks: Colo.—N.M. *Alp.*—*Mont.* Je—Au.

4. SEDUM L. STONE-CROP, ORPINE.

Annual or perennial, fleshy herbs. Leaves mostly alternate, often imbricate, entire or dentate. Flowers perfect, in terminal, often one-sided cymes. Sepals distinct or somewhat united, 4 or 5. Petals 4 or 5, distinct, or rarely slightly united at the base. Stamens 8–10, the alternate ones often adnate to the base of the petals. Carpels 4 or 5, distinct, or united at the very base, more or less spreading or at least ascending, usually many-seeded.

Leaves linear, linear-oblanceolate, or oblong, terete or nearly so.

Leaves lanceolate to oblong or spatulate, more or less flattened.

Leaves of the flowering stems lanceolate, broadest at the base.

Leaves spatulate or obovate, narrow at the base.

1. *S. stenopetalum*.

2. *S. Douglasii*

3. *S. Leiberghii*

1. *S. stenopetalum* Pursh. Perennial, tufted; flowering stems 8–18 cm. high; leaves crowded, but scarcely imbricate, except on the sterile shoots, sessile, linear, 6–16 mm. long; cymes forked; petals yellow, narrowly lanceolate; follicles about 4 mm. long, ascending, with divergent tips. *S. subalpinum* Blankinship. On rocks: Sask.—Neb.—N.M.—Calif.—Alta. *Plain*—*Mont.* Je—Au.

2. *S. Douglasii* Hook. Perennial, with a branching rootstock; stems erect or ascending, 1–3 dm. high; leaves narrowly lanceolate or linear-lanceolate, acuminate, sessile, 1–2.5 cm. long, flat above; cyme forked; petals 6–12 mm long, yellow, longer than the stamens; follicles 3–4 mm. long, widely divergent from the base. Rocky places: Mont.—Ida.—Calif.—B.C. *Submont.*—*Mont.* Je—Au.

3. *S. Leiberghii* Britton. Perennial, with a rootstock; stem simple, about 2.5 cm. high; leaves, except those of the inflorescence, oblanceolate or spatulate, 1–1.5 mm. long; cyme open; flowers sessile; petals yellow, narrowly lanceolate, acuminate, 7–9 mm. long; follicles divergent from the united bases. *Sedum duaricatum* S. Wats., not Ait. Rocky places: Ore.—Wash.—Ida. *Son.* My—Jc.

5. **TILLAEÁSTRUM** Britton.

Small glabrous aquatic annuals. Leaves opposite, entire. Flowers perfect, small, solitary, axillary. Sepals 4, distinct. Petals usually 4, distinct or united at the base. Stamens 4. Carpels 4, distinct, several-seeded; styles short.

1. **T. aquaticum** (L.) Britton. Stem 1-8 cm. high; leaves linear-oblong, connate at the base, 4-6 mm. long; flowers subsessile; petals greenish, about twice as long as the sepals; follicles ovoid, 8-10-seeded. *Tillaea aquatica* L. In mud or water: N.S.—Md.—La.—Tex.—L. Calif.—Wash.; Eurasia. *Plain—Mont.*

FAMILY 56. **PARNASSIACEAE**. GRASS OF PARNASSUS FAMILY.

Scapose perennials, with rootstocks and basal petioled entire leaves. Flowers solitary on the scape, perfect, regular. Sepals 5, imbricate. Petals 5, imbricate, white or nearly so, conspicuously veined. Stamens 5, alternate with the petals and with 5 clusters of united gland-tipped staminodia. Gynoecium of 3 or 4 united carpels; ovary superior or half inferior, with 3 or 4 parietal placentae; style obsolete; stigmas 3 or 4. Fruit a 1-celled capsule, loculicidal at the apex.

1. **PARNASSIA**. GRASS OF PARNASSUS.

Characters of the family.

Petals fimbriate on the sides, at least below, free portions of the staminodia very short and stout, leaf-blades reniform or cordate, usually broader than long

Petals obovate, 5-nerved, staminodial scales with 5-9 lobes, sepals elliptic

1 *P. fimbriata*.

Petals oblong, 3-nerved, staminodial scales with 3-5 lobes, sepals narrowly lanceolate

2 *P. rivularis*.

Petals entire, not fimbriate, free portion of the staminodia long

Petals 5-9-veined, usually exceeding the sepals, capsule less than twice as long as the sepals; bract some distance from the base

Staminodia 7-15 in each fascicle, basal leaf-blades cordate or rounded at the base

Petals nearly twice as long as the sepals, hypanthium inconspicuous, staminodia usually 9-15 in each fascicle

3 *P. palustris*

Petals only slightly exceeding the sepals; hypanthium conspicuous, obconic, fully half as long as the sepals and nearly as broad as high, staminodia 7-9 in each fascicle

4 *P. montanensis*.

Staminodia 5-7 in each fascicle, basal leaf-blades acute at the base

5 *P. parviflora*.

Petals 3-veined, thin, scarcely equalling the sepals; capsule twice as long as the sepals, bract none or near the base

6 *P. Kotzebuei*

1. **P. fimbriata** König. Leaf-blades reniform or broadly cordate, 2-4 cm. wide, thin; scape 2-3 dm. high, sepals 5-6 mm. long, elliptic or oval, obtuse, and often crenulate at the apex; petals obovate, 7-8 mm. long; capsule 1 cm. long or more. Springy places in the mountains: Alta.—Colo.—Calif.—Alaska. *Mont. —Subalp.* Jl-S.

2. **P. rivularis** G. E. Osterhout. Leaf-blades reniform or broadly cordate, thin, about 7-ribbed, 1-2 cm. wide; scape slender, about 1 dm. high; sepals narrowly lanceolate, acute, about 3 mm. long; petals oblong, about 6 mm. long; capsule ovoid. Springy places in the mountains: n Colo. *Mont.*

3. **P. palustris** L. Leaf-blades cordate, 1-3 cm. wide; scape 1-3 dm. high; sepals oblong or elliptic, 4-6 mm. long; petals oval, 8-12 mm. long; capsule ovoid, about 1 cm. long. Wet places: Lab.—Que.—Mich.—Wyo.—Alaska; Eurasia. *Mont.* Jl-Au.

4. **P. montanensis** Fern. & Rydb. Leaf-blades ovate, with a subcordate or rounded base, 1-2 cm. long, 8-18 mm. wide; scape about 2 dm. high; sepals oblong to lanceolate, acute, 7-9 mm. long; petals oval to elliptic; capsule rounded-ovoid, about 1 cm. long. Wet river banks: Mont.—B.C.—Sask. *Submont.—Mont.* Jl-Au.

5. **P. parviflora** DC. Leaf-blades oval or ovate, 1-3 cm. long, 0.75-2 cm. wide; scape slender, 1-3 dm. high; sepals oblong, 5-8 mm. long; petals elliptic

or oval, 6-10 mm long; capsule ovoid, about 1 cm. long. Wet places and swamps: Lab.—Que.—S.D.—Colo.—Utah—Alta. *Plain—Mont.* Jl—S.

6. P. Kotzebuei Cham. Leaf-blades broadly ovate or somewhat cordate, 1-2 cm. long; scape slender, about 1 dm. (seldom 2 dm.) high; staminodial scales short, with 3-5 filiform short filaments; sepals oblong, 5-7 mm. long; capsule ovoid, about 12 mm. long. Wet places: Greenl.—Que.—Wyo.—Alaska; ne Asia. *Subalp.* Jl—Au.

FAMILY 57. **SAXIFRAGACEAE.** SAXIFRAGE FAMILY.*

Herbs, usually without stipules. Leaves alternate, rarely opposite, often all basal. Flowers perfect, regular or nearly so. Hypanthium often well developed, from flat to cylindric, often more or less adnate to the ovary. Sepals 5, rarely 4, distinct. Petals as many or wanting. Stamens as many or twice as many as the sepals, in one genus only 3. Gynoecium of 2, rarely of 3 or 4, carpels, more or less united, rarely wholly distinct; placentae parietal, basal, or axial. Fruit a capsule or follicles.

- Placentae parietal, sometimes nearly basal
 Flowers solitary and axillary to leaf-like bracts, or 2-4 in small corymbs, each subtended by a leaf-like bract, sepals 4; petals wanting. 1 *CHRYSOSPENIUM.*
 Flowers in more or less elongate racemes or panicles.
 Gynoecium of 2 or 3 equal or essentially equal carpels.
 Flower-stalk axial, from a slender bulbiferous rootstock; gynoecium 3-carpellary. 2. *LITHOPHRAGMA.*
 Flower-stalk a lateral shoot from a stout scaly rootstock; gynoecium 2-carpellary.
 Inflorescence racemose.
 Petals pinnately cleft or pinnatifid
 Hypanthium deeply campanulate or urn-shaped, deeper than the length of the sepals, capsule tapering into a beak. 3. *TELLIMA.*
 Hypanthium saucer-shaped or open campanulate, shallower than the length of the sepals, capsules abruptly beaked or beakless.
 Ovary more than half superior; disk inconspicuous; stigmas entire, terminating distinct styles
 Stamens 10; placentae almost basal, bearing few ovules 4. *MITELLA.*
 Stamens 5; placentae parietal, bearing many ovules 5. *MITELLASTRA.*
 Ovary wholly inferior, covered with the prominent disk, stigmas sessile, 2-lobed; stamens 5. 6. *PECTANTIA.*
 Petals entire, toothed or 3-cleft above; stamens 5
 Hypanthium campanulate during anthesis, ovary half inferior. 7. *OZOMELIS.*
 Hypanthium turbinate during anthesis; ovary almost wholly inferior 8. *CONMITELLA.*
 Inflorescence paniculate, stamens 5, petals broadened upward. 9. *HEUCHERA.*
 Gynoecium of 2 very unequal carpels. 10. *TIARELLA.*
 Placentae axial.
 Hypanthium well-developed, and accrescent, at maturity longer than the sepals
 Stamens 5.
 Plants with short bulblet-bearing rootstocks; flower-stalk axial.
 Ovary half inferior; blade of the basal leaf ternately divided, stamens borne on the outer edge of a thickened disk. 11. *HEMIEVA.*
 Ovary two-thirds inferior or more; blade of the basal leaf merely crenate; disk obsolete. 12. *SUKSDORFIA.*
 Plants with horizontal rootstocks; flower-stalk a lateral shoot.
 Sepals imbricate, petals marcescent; seeds winged. 13. *SULLIVANTIA.*
 Sepals valvate; petals deciduous, seeds wingless. 14. *THEROPON.*
 Stamens 10.
 Petals clawed; styles partially united; plants with thick rootstocks. 15. *TELESNIX.*
 Petals clawless; styles distinct; plants with slender rootstocks, often with offsets.
 Plants without caudices, producing only annual flowering stems. 16. *SAXIFRAGA.*
 Plants with perennial very leafy caudices, often with offsets, the flowering stems very different from the caudices.

* Adapted and abbreviated from Small & Rydberg in *North American Flora*, Vol. 22.

- Leaves of the caudex with lobed blades, the margins poreless. 17. *MUSCARIA*.
 Leaves of the caudex with serrate blades, each tooth with an encrusting pore. 18. *CHONDROSEA*.
 Hypanthium only slightly developed, unchanged at maturity, or if slightly accrescent, then flat and plants acaulescent.
 Leaves alternate, sometimes all basal.
 Plants acaulescent.
 Corolla essentially regular, the petals about equal in shape and length. 19. *MICRANTHES*.
 Corolla irregular, except sometimes that of the terminal flower, 3 of the petals with blades of an ovate or lanceolate type and 2 of them narrower and longer. 20. *SPATULARIA*.
 Plants caulescent
 Leaves without stipules.
 Carpels distinct, leaf-blades toothed. 21. *LEPTARRHENA*.
 Carpels partially united; leaf-blades entire or rarely with 3 apical tooth-like lobes. 22. *LEPTASEA*.
 Leaves with reniform or orbicular, shallowly lobed blades and wing-like stipules at the base of the petioles. 23. *HETERISIA*.
 Leaves opposite, except sometimes on the flower-stalks. 24. *ANTIPHYLLA*.

1. **CHRYSOPLERIUM** (Tourn.) L. GOLDEN SAXIFRAGE,
 WATER CARPET.

Low, somewhat succulent herbs, mainly semi-aquatic; all North American species, with perennial rootstocks. Flowers small, axillary or terminal, solitary or in small corymbs. Hypanthium saucer-shaped or campanulate, adnate to the lower portion of the gynoecium and usually lined with a disk. Sepals normally 4. Petals none. Stamens 4-8 (rarely 10), inserted on the margin of the disk. Gynoecium 1-celled, 2-lobed; styles 2, usually short; placentae parietal, many-ovuled.

Leaves all alternate; flowers clustered near the ends of the stems; stamens 4

- Lower leaves opposite; flowers solitary in the leaf-axils, stamens mostly 8. 1. *C. tetrandrum*.
 2. *C. americanum*.

1. ***C. tetrandrum*** Th. Fries. Perennial, with a stoloniferous rootstock; stem 1.5-8 cm. high; leaf-blades thick, reniform, 4-12 mm. wide, crenate with 3-5 broad teeth; sepals usually 4; stamens opposite to the sepals. Wet places, arctic-alpine situations: Arctic coast—Colo. *Subalp.* Jl-S.

2. ***C. americanum*** Schwein. Perennial, with a slender, stoloniferous rootstock; stem decumbent, forked above, glabrous or nearly so, 7-20 cm. long; leaf-blades broadly obovate, orbicular or rarely reniform, 4-20 mm. wide. Wet shady places: N.S.—Ga.—Minn.—Sask. *Plain.* Ap-Au.

2. **LITHOPHRAGMA** Nutt. STAR-FLOWER, PRAIRIE STAR,
 WOODLAND STAR.

Perennial herbs, with slender bulblet-bearing rootstock and axial leafy flowering shoots. Flowers racemose, perfect; hypanthium campanulate or hemispheric and adnate to the very base of the ovary, to elongate-turbinate and adnate to the lower half thereof. Sepals 5, valvate, rounded to triangular. Petals white or rose-colored, clawed, digitately or pinnately divided, toothed, or entire, much exceeding the sepals. Stamens 10, included; filaments short; anther cordate. Gynoecium 1-celled with 3 parietal placentae, 3-valved at the apex; styles 3, short. Seeds many.

Hypanthium campanulate or hemispheric, mostly rounded at the base, adnate only to the base of the ovary.

Stem-leaves seldom bulbiferous in the axils; stipules long and narrow, the free portion triangular or lanceolate, not fimbriate.

Hypanthium with the sepals 2-3 mm. long; petals about 2 mm. long.

Pedicels short, in fruit not exceeding the capsule in length; seeds smooth.

Pedicels in fruit much longer than the capsule; seeds muriculate. 1. *L. tenella*.

Hypanthium with the sepals 3-4 mm. long; petals 3-5 mm. long. 2. *L. glabra*.

Stem-leaves usually bulbiferous in their axils; stipules short and broad, the free portion rounded and fimbriate. 3. *L. australis*.

Hypanthium deeply obconic, adnate to the lower half of the ovary. 4. *L. bulbifera*.
 5. *L. parviflora*.

1. *L. tenella* Nutt. Stem slender, 1-1.5 dm. high, glandular-puberulent throughout; leaf-blades less than 1 cm. broad, orbicular-flabellate in outline, glandular-puberulent, 3-cleft half their length; lobes cuneate, 3-toothed; pedicels about 2 mm. long; hypanthium almost hemispheric, together with the sepals 2 mm. long; petals 3-cleft at the apex. Rocky banks and hillsides: Alta.—Wyo. *Submont.*—Mont. My-Je.

2. *L. glabra* Nutt. Stem 1-2 dm. high, minutely glandular-puberulent or glabrous; leaf-blades ternately divided to near the base, puberulent, divisions cuneate, 0.5-1.5 cm. long, 3-lobed; hypanthium campanulate, puberulent, together with the sepals 2.5-3 mm. long; petals 3-cleft at the apex. Damp ground: Ore.—Wyo.—Mont. *Submont.* Je.

3. *L. australis* Rydb. Stem 1-2 dm. high, stout, glandular-puberulent; leaf-blades ternately divided to near the base; divisions 1.5-2 cm. long, rhombic or cuneate, deeply cleft and toothed, pedicels 2-5 mm. long; hypanthium campanulate, slightly striate, with the sepals 3-4 mm. long; petals broadly cuneate, deeply 3-5-cleft. Hillsides and drier meadows: N.M.—Wyo.—Utah—Ariz. *Submont.*—Mont. My-Je.

4. *L. bulbifera* Rydb. Stem 1-2 dm. high, glandular-puberulent; leaf-blades ternately divided to the base; divisions 0.5-1 cm. long, cuneate or obovate, 3-cleft and toothed; pedicels 3-5 mm. long, or in fruit 1 cm. long; hypanthium campanulate, together with the sepals 3-4 mm. long, petals 4-7 mm. long, 3-5-cleft, white or sometimes rose-colored. Dry hills: S.D.—Colo.—Calif.—B.C. *Submont.*—*Subalp.* Ap-Jl.

5. *L. parviflora* (Hook.) Nutt. Stem 1-3 dm. high, glandular-puberulent and somewhat hirsutulous; leaf-blades more or less hirsutulous, divided to the base into 3-5 divisions, which are 1-3 cm. long, twice ternately cleft into oblong or linear lobes; pedicels 2-4 mm. long; hypanthium together with the sepals 5-8 mm. long; petals deeply 3-5-cleft into narrowly oblong divisions. Rocky or gravelly places. Alta.—S.D.—Colo.—Calif.—B.C. *Submont.*—Mont. Ap-Jl.

3. TELLIMA R. Br.

Coarse hirsute perennials, with thick scaly rootstock and axillary leafy flowering shoots. Stipules present but small. Hypanthium urn-shaped or deeply campanulate, adnate only to the base of the gynoeceum. Sepals ovate, erect, valvate in bud. Petals white or tinged with purple, spreading, with a cuneate claw and pinnately divided blade. Stamens 10, short, included, anthers 2-celled. Gynoeceum 1-celled, with 2 parietal many-seeded placentae; styles 2; stigmatic capitate. Capsule opening between the beaks. Seeds horizontal.

1. *T. grandiflora* (Pursh) Dougl. Flowering branches 3-6 dm. high, hirsute with long hairs, glandular above, leafy; blades of basal leaves reniform, sparingly hirsute, round-lobed, 4-10 cm. broad; stem-leaves short-petioled, with more or less developed stipules; hypanthium glandular-puberulent, cylindro-campanulate, 8-10 mm. long; petals purplish or pink; claw erect; blade spreading or reflexed; ovary united with the hypanthium only at the base. Rich moist woods: Alaska—B.C.—Calif. *Submont.* Ap-Jl.

4. MITELLA (Tourn.) L. MITERWORT, BISHOP'S CAP.

Low perennials, with scaly rootstocks and lateral flowering branches. Inflorescence racemose. Hypanthium saucer-shaped or open-campanulate, adnate to the base of the gynoeceum. Sepals triangular or ovate, valvate in aestivation. Petals 5, pectinately pinnatifid. Stamens 10, included; filaments short, subulate. Gynoeceum mostly superior, 1-celled, with 2 parietal placentae, ovuliferous only at the base; styles distinct, short; stigma obtuse, simple. Capsule 2-valved at the summit, few-seeded.

1. *M. nuda* L. Perennial, producing long runners later in the season; flowering branches scapiform, 0.5-2 dm. high, sparingly hairy; leaf-blades reniform, 2-5 cm. in diameter, rounded-crenate or slightly round-lobed; calyx about 6 mm. wide; sepals yellowish green, triangular-ovate; petals about twice as long

as the sepals. Cold woods and peat-bogs: Lab.—Newf.—B.C.—Mont.; e Asia *Boreal*—Mont. My—Jl.

5. MITELLÁSTRA (T. & G.) Howell.

Slender glandular pubescent perennials, with scaly rootstocks and lateral leafy flowering shoots. Inflorescence racemose. Hypanthium saucer-shaped, adnate only to the base of the gynoecium. Sepals 5, triangular, valvate in aestivation. Petals pectinately pinnatifid, with filiform divisions. Stamens 5, opposite the sepals; filaments slender, about two-thirds as long as the sepals. Gynoecium nearly wholly superior, with 2 parietal many-ovuled placentae. Styles 2, distinct, slender, tapering into the stigmas. Capsule as in *Mitella*.

1. *M. caulescens* (Nutt.) Howell. Flowering branches 1-3-leaved, puberulent and somewhat hirsute, 1.5-3 dm. high; basal leaf-blades broadly cordate or reniform, 5-7-lobed, with triangular-ovate lobes and crenate, hirsute on both sides, 3-5 cm. broad; stem-leaves similar but short-petioled, alternate; flowers yellowish green; hypanthium with the calyx about 5 mm wide; sepals broadly triangular. *Mitella caulescens* Nutt. Shady woods: B.C.—Mont.—Ida.—Calif. *Submont.* My—Jl.

6. PECTIÁNTHIA Raf.

Low perennials, with scaly rootstocks and lateral, scapiform flowering branches. Inflorescence racemose. Hypanthium saucer-shaped, wholly adnate to the depressed ovary. Sepals 5, triangular or ovate, reflexed, valvate in aestivation. Petals 5, pectinately pinnatifid, with filiform divisions. Stamens 5, on the margin of a distinct disk, which covers the ovary; filaments very short, inflexed, anthers reniform. Gynoecium 1-celled, depressed, mostly inferior, with 2 parietal, but almost basal placentae. Stigmas 2, subsessile, 2-lobed at the apex. Seeds numerous.

Stamens opposite to the petals.

1 *P. pentandra*.

Stamens opposite to the sepals.

2 *P. Breweri*.

1. *P. pentandra* (Hook.) Rydb. Flowering branches scapiform, naked, 1-3 dm. high; blades of the basal leaves broadly cordate, coarsely crenate, and with 9-11 more or less distinct round lobes, thin, 3-6 cm. in diameter; raceme lax, with the flowers not rarely in pairs; hypanthium with the calyx 3-3.5 mm. wide, green, often purplish inside, sepals broadly triangular. *Mitella pentandra* Hook. Mossy banks, in the woods: Alaska—Alta.—Colo.—Calif. *Mont.*—*Subalp.* Je—Au.

2. *P. Breweri* (A. Gray) Rydb. Flowering branches 1-2 dm. high, scapiform, leafless, very sparingly hairy; blades of the basal leaves reniform, with many shallow rounded lobes, serrate-crenate, thin, sparingly hairy on both sides or glabrous, 4-7 cm. broad; flowers green, occasionally in pairs; hypanthium with the calyx 3-4 mm. wide, sepals very broadly ovate, obtuse. *M. Breweri* A. Gray. Damp woods in the mountains: Alta.—Ida.—Calif.—B.C. *Mont.*—*Subalp.* Je—Au.

7. OZOMÉLIS Raf. MITREWORT.

Perennials, with scaly rootstocks and lateral scapiform flowering shoots. Leaves basal, long-petioled, with rounded-reniform or cordate blades. Inflorescence racemose. Hypanthium campanulate, adnate to the lower half of the ovary. Sepals 5, ovate or oblong, erect, valvate in aestivation. Petals 5 or lacking, 3-cleft, toothed or entire. Stamens 5, opposite to the sepals; disk obsolete; filaments short, erect; anthers reniform. Gynoecium half-inferior, 1-celled, with 2, parietal, many-ovuled placentae; styles 2, very short; stigmas capitate.

Midvein of the sepals branched; side-veins simple; petals cuneate or oblanceolate, with lanceolate lobes or entire

Petals cuneate, about twice as long as the sepals, 3-fid with subequal divisions

1. *O. trifida*

Petals oblanceolate, slightly exceeding the sepals, entire or slightly and unequally toothed.

2. *O. rotacea*.

Midveins of the sepals simple, lateral veins branched; petals filiform or 3-fid, with filiform divisions, 1-nerved.

Petals 3-fid to the middle; hypanthium with the sepals 4-5 mm. long.

Petals entire or 3-fid only at the apex; hypanthium with the sepals 1.5-3 mm. long.

Hypanthium with sepals 2-3 mm. long; leaf-blades indistinctly lobed and with shallow crenulations; petals often entire.

Hypanthium with the sepals 1.5-2 mm. long; leaf-blades distinctly lobed and deeply crenate; petals 3-cleft.

3. *O. stauropetala*.

4. *O. stenopetala*.

5. *O. Parryi*.

1. *O. trifida* (Graham) Rydb. Flowering branches 2-3 dm. high, naked, glandular-puberulent; leaf-blades reniform, 2-4 cm. broad, 7-9-lobed, with broad shallow rounded lobes and crenate, sparingly hairy on both sides; raceme short, 2-6 cm. long; hypanthium with the sepals 3 mm. long; sepals green, triangular-ovate. *Mullella trifida* Graham. Wet woods: Alta.—B.C. Mont. My—Au.

2. *O. violacea* Rydb. Flowering branches 2-3 dm. high, naked, glandular-puberulent; leaf-blades broadly cordate in outline, slightly 5-7-lobed with rounded, finely crenate lobes; racemes short, with almost sessile flowers; hypanthium with the sepals 3 mm. long and 2 mm. wide; sepals ovate, obtuse. *M. violacea* Rydb. Mossy banks in woods: Mont. Submont. Je—Jl.

3. *O. stauropetala* (Piper) Rydb. Flowering branches naked, 3-5 dm. high, glandular-puberulent throughout, or slightly hirsute below; leaf-blades rounded-reniform, indistinctly 5-9-lobed, with round crenate lobes, sparingly hirsute on both sides; racemes rather elongate; pedicels about 1 mm. long; sepals oblong-ovate; petals fully twice as long as the sepals. *M. stauropetala* Piper. Spriggy places in woods: Mont.—Colo.—Ore.—Wash. Mont. My—Jl.

4. *O. stenopetala* (Piper) Rydb. Flowering branches leafless, 3-5 dm. high, puberulent; leaf-blades rounded-reniform, 2-6 cm. wide, ciliate on the margin, indistinctly round-lobed and crenate; raceme secund, often 1 dm. long; flowers almost sessile; sepals whitish, oblong, obtuse; petals about half longer than the sepals. *M. trifida* S. Wats. *M. stenopetala* Piper. Damp places: Utah—Colo.—Wyo. Mont. Je—Jl.

5. *O. Parryi* (Piper) Rydb. Flowering branches leafless, 1.5-3 dm. high, glandular-puberulent above, slightly hairy below; leaf-blades 2-3 cm. wide, reniform, sparingly hairy on the veins and the margin, more distinctly lobed than in the preceding, deeply crenate; racemes 2-7 cm. long, often secund; flowers nearly sessile; sepals whitish, rounded-oblong, obtuse; petals about half longer than the sepals. *M. stenopetala Parryi* Piper. Mountains: Wyo.—Colo.—Utah. Mont. My—Au.

8. CONIMITÉLLA Rydb.

Perennials, with scaly cespitose rootstocks and scapiform lateral flowering branches. Inflorescence racemose. Leaves basal, long-petioled, with reniform blades. Hypanthium elongate, turbinate, regular, adnate to the larger part of the ovary. Sepals 5, oblong, erect. Petals 5, long-clawed, spatulate, entire. Stamens 5; filaments very short. Gynoecium mostly inferior, one-celled, with 2 parietal placentae and numerous ovules; stigmas subsessile, capitate. Seeds muricate.

1. *C. Williamsii* (D. C. Eaton) Rydb. Flowering branches leafless, 4-6 dm. high, glandular-puberulent; leaf-blades reniform, thick, shining, 3-4 cm. wide, indistinctly round-lobed and crenate, hispid-ciliate on the margin, often tinged with red; raceme short, 3-10 cm. long, 6-12-flowered; hypanthium 3-4 mm. (in fruit 8-10 mm.) long, finely puberulent; sepals oblong, 1 mm. long, obtuse, yellowish; petals 5-6 mm. long, narrowly spatulate. *Heuchera Williamsii* D. C. Eaton. *Tellima nudicaulis* Greene. *Tellima pentandra* Canby. *Lithophragma Williamsii* Greene. Hillsides and open places: Mont.—Ida.—Wyo. Submont.—Mont. Je—Jl.

9. HEÛCHERA L. ALUM-ROOT, KALISPELL.

Perennials, with scaly rootstocks and lateral flowering branches, which are either scapiform or leafy. Basal leaves petioled, with palmately veined, broad blades. Inflorescence paniculate. Hypanthium cylindric to saucer-shaped,

most often campanulate, adnate to the lower part of the gynoeceium, often more or less oblique. Sepals 5, often very unequal. Petals 5, often more or less clawed. Stamens 5, opposite to the sepals; filaments usually filiform. Gynoeceium partly inferior, 1-celled, with 2 parietal, many-ovuled placentae; styles 2, distinct, elongate. Capsule opening between the two more or less divergent beaks.

Stamens equalling or exceeding the sepals

Panicle open, not spike-like

Hypanthium turbinate, about as broad as long; stamens at least twice as long as the sepals. 1. *H. glabra*.

Hypanthium deeply campanulate or urceolate, about twice as long as broad; stamens slightly exceeding the sepals.

Hypanthium strongly oblique

Hypanthium with the sepals more than 1 cm. long; petioles glabrous or sparingly short-hairy 2. *H. Richardsonii*.

Hypanthium with the sepals less than 1 cm. long; petioles long-hispid. 3. *H. hispida*.

Hypanthium not strongly oblique.

Panicle contracted, dense, spike-like

Stamens shorter than the sepals.

Hypanthium short-campanulate to saucer-shaped, together with the sepals 3-5 mm. long.

Petioles more or less hirsute

6. *H. novomericana*.

Petioles glabrous or puberulent.

Hypanthium campanulate, yellowish or pinkish; sepals almost erect

Leaf-blades deeply lobed, lobes again lobed and toothed; petals narrowly oblanceolate, nearly twice as long as the sepals. 7. *H. gracilis*.

Leaf-blades merely once 5-7-lobed and toothed, petals spatulate, from equalling to half longer than the sepals.

Base of the leaf-blades with an open sinus, or almost cuneate, plant 1-3 dm. high. 8. *H. Hallii*.

Base of the leaf-blades with a narrow sinus; plant 3-5 dm. high. 9. *H. grossularifolia*.

Hypanthium saucer-shaped, sepals spreading.

Hypanthium with the sepals 4 mm. high, yellowish; blades of the petals rhombic. 10. *H. flavescens*.

Hypanthium with the sepals 2-3 mm. high, greenish; petals oblanceolate or spatulate.

Leaf-blades with shallow lobes.

Sinus of the leaf-blades closed, the basal lobes often overlapping; petals not exceeding the sepals. 11. *H. utahensis*.

Sinus of the leaf-blades open, petals exceeding the sepals

12. *H. parvifolia*.

Leaf-blades cleft at least one-half to the base 13. *H. flabellifolia*.

Hypanthium deeply campanulate or urceolate, with the sepals 5-10 mm. long.

Flowering branches and petioles pubescent.

Flowers greenish, leaf-blades reniform or rounded, deeply cordate at the base lobes and teeth rounded, petioles long-hairy. 14. *H. chloantha*.

Flowers yellowish, leaf-blades broadly oval to orbicular, truncate or slightly cordate at the base.

Leaf-blades thick, densely glandular-pubescent, 1.5-4 cm. wide, rarely cordate at the base 15. *H. ovalifolia*.

Leaf-blades thin, glabrous, or hairy only on the veins, 3-6 cm. wide, cordate at the base. 16. *H. cylindrica*.

Flowering branches and petioles glabrous or finely puberulent.

Flowers yellowish; leaf-blades rounded-oval to orbicular, truncate or slightly cordate at the base, only the earliest reniform 17. *H. glabella*.

Flowers greenish, leaf-blades thin, reniform or rarely rounded, with deeply cordate base. 18. *H. tenuifolia*.

1. *H. glabra* Willd. Flowering branches 1-5 dm. high, glabrous, 1-3-leaved, rarely scapiform; leaf-blades cordate or round-cordate, deeply 5-7-lobed, sparingly hispidulous when young, soon glabrate, thin and shining, 3-10 cm. broad; lobes triangular-ovate, doubly serrate; panicle lax; hypanthium with the sepals 2.5-3 mm. long; petals broadly spatulate or ovate, with a slender claw, about twice as long as the sepals. Damp shady rocks: Yukon—Alta.—Ore.—Alaska. *Mont.* Je-S.

2. *H. Richardsonii* R. Br. Flowering branches 3-4 dm. high, scapiform, sparingly short-hirsute and glandular-puberulent above; leaf-blades rounded-cordate, 3-6 cm. broad, with rounded lobes and broadly ovate teeth, sparingly hispidulous, ciliate on the margins; petals spatulate, purplish, slightly exceeding the oblong sepals. Hills: Man.—S.D.—B.C. *Plain*—*Submont.* Je.

3. *H. hispida* Pursh. Flowering branches scapiform, usually densely hispid, 6-12 dm. high; leaf-blades orbicular-cordate or reniform, 4-7 cm. wide, 5-9-lobed, with shallow rounded lobes and broad teeth, hirsute beneath and ciliate on the margins; petals spatulate, equalling or shorter than the sepals. *H. ciliata* Rydb. Woods and hillsides: Ont.—Va.—Kans.—Wyo.—Mont. *Plain*—Mont. My-Jl.

4. *H. rubescens* Torr. Flowering branches scapiform, naked, 2-4 dm. high, straw-colored, shining; leaf-blades reniform or rounded-cordate, 2-4 cm. wide, glabrous or minutely puberulent, thick, shining, rounded 5-lobed and with rounded bristle-tipped teeth; hypanthium campanulate, pinkish, glandular-puberulent, with the sepals 5 mm. long; petals linear-oblancoolate, acute, about twice as long as the sepals. Mountains: Utah—Calif.—Ore. *Son.*—Mont. Je—Au.

5. *H. bracteata* (Torr.) Seringe. Flowering branches usually about 1 dm. seldom 3 dm. high, glandular-puberulent or glabrate, usually with a few minute leaves; leaf-blades rounded-reniform, 1-3 cm. in diameter, more or less round-lobed, and with ovate cuspidate-tipped teeth, glandular-puberulent, and minutely ciliate on the margins; hypanthium deeply campanulate, glandular-puberulent, together with the oblong sepals 3-4 mm. long; petals oblanceolate or spatulate, slightly exceeding the sepals. Mountains: Colo.—s Wyo. *Submont.*—Mont. Je—Au.

6. *H. novomexicana* Wheelock. Flowering branches scapiform, glandular-puberulent or slightly hirsute below, 3-5 dm. high; leaf-blades reniform or rounded-cordate, with 7-9 rounded lobes and broadly ovate teeth, glabrous above, hairy on the veins beneath, ciliate on the margins; hypanthium turbinate-campanulate, glandular-puberulent, yellowish, together with the rounded-ovate sepals 3-4 mm. long; petals spatulate, almost clawless, equalling the sepals. Mountains: N.M.—s Utah—Ariz. *Mont.*

7. *H. gracilis* Rydb. Flowering branches scapiform, very slender, about 4 dm. high, finely glandular-puberulent; leaf-blades rounded-reniform, very thin, glabrous, about 3 cm. broad, deeply 5-7-lobed; teeth bristle-pointed, panicles very short and narrow; hypanthium yellowish, with the erect oblong obtuse sepals about 4 mm. long. Mountains: Ida. *Submont.* Jl.

8. *H. Hallii* A. Gray. Flowering branches scapiform, naked, glabrous or minutely puberulent, 1-3 dm. high; leaf-blades rounded-reniform, with an open sinus, deeply 5-7-lobed and with ovate, bristle-tipped teeth, 1-3 5 cm. wide, glabrous or minutely glandular-puberulent; inflorescence narrow, short, hypanthium yellowish or pinkish, together with the rounded-ovate sepals 4-5 mm. long. Mountain sides: Colo. *Submont.*—*Subalp.* Jl—Au.

9. *H. grossularifolia* Rydb. Flowering branches 3-5 dm. high, scapiform, naked, glabrous or sparingly glandular-puberulent, leaf-blades rounded-cordate or reniform, with a deep sinus at the base, thin, glabrous or minutely glandular-puberulent, 5-7-lobed, with rounded lobes and round-ovate bristle-tipped teeth, inflorescence very short and narrow; hypanthium yellow, together with the ovate sepals 4 mm. long. Rocky hillsides: Mont—Ida.—Ore. *Mont* Je—Jl.

10. *H. flavescens* Rydb. Flowering branches scapiform, naked, glandular-puberulent, 4-6 dm. high; leaf-blades reniform or rounded-cordate, thin, glabrous, except the ciliate margins, round-lobed and with very broadly ovate mucronate teeth, 3-6 cm. wide; inflorescence elongate; sepals triangular-ovate; petals exceeding the sepals. Rocky hills and mountains: N.M.—Ariz.—Utah. *Mont.*—*Subalp.* Je—Jl.

11. *H. utahensis* Rydb. Flowering branches 5-6 dm. high, minutely puberulent; leaf-blades reniform, 5-8 cm. broad, almost glabrous and shining, crenate, with rounded or truncate teeth; inflorescence narrow, but open. Hills and cañons: Utah. *Submont.* Je—Au.

12. *H. parvifolia* Nutt. Flowering branches scapiform, naked, glandular-pubescent, 1-4 dm. high; leaf-blades reniform, with 7-9 shallow, rounded lobes, crenate with round teeth; inflorescence first short, but soon elongate; petals

yellowish, spatulate, with a broad, short claw. Hills: Alta.—N.M.—Ariz.—Ore. *Submont.*—Alp. My—Au.

13. *H. flabellifolia* Rydb. Flowering branches slender, 2-3 dm. high, glandular-puberulent, subscapose; leaf-blades 1.5-3 cm. broad, rounded-reniform, cleft one-third to one-half to the base into 7-9 somewhat cuneate lobes, which are rounded-crenate at the apex, the sinuses between the lobes of the leaves very narrow and rounded at the bottom, the lobes often overlapping. *H. parvifolia dissecta* M. E. Jones. Hills and mountain sides: Alta.—Mont.—n Wyo. Plain—Mont. My—Au.

14. *H. chlorantha* Piper. Flowering branches scapiform, villous with long (in age brown) hairs, 5-7 dm. high; leaf-blades reniform or rounded-cordate, 5-8 cm. wide, round-lobed and with ovate cuspidate teeth; inflorescence dense; hypanthium hirsute and glandular, together with the oblong sepals 7-8 mm. or in fruit over 1 cm. long; petals minute or usually lacking. *H. cylindrica* T. & G., not Dougl. Low ground and river banks: B.C.—Ore.—Ida. *Submont.* JI—Au

15. *H. ovalifolia* Nutt. Flowering branches scapiform, naked, densely glandular-pubescent, with short hairs; leaf-blades rounded-oval, 1.5-4 cm. broad and 2-5 cm. long, truncate, rounded or slightly cordate at the base, round-lobed, and crenate; hypanthium together with the broadly oblong sepals about 7 mm. long; petals usually wanting. *H. cylindrica alpina* S Wats *H. saxicola* E. Nels. Rocky banks and hillsides: Alta.—Wyo.—Ore.—B.C. *Submont.*—Alp. Je—Au.

16. *H. cylindrica* Dougl. Flowering branches scapiform, naked, hirsute with white hairs, about 5 dm. high; leaf-blades orbicular or nearly so, deeply cordate at the base, glabrous or ciliate on the margins and veins, thin and shining, 3-6 cm. broad, round-lobed and crenate; inflorescence spike-like; hypanthium together with the oblong sepals 6-9 mm. long. *H. columbiana* Rydb. Hills: Ore.—Ida.—Mont.—B.C. *Submont* My—Jl.

17. *H. glabella* T. & G. Flowering branches scapiform, 4-6 dm. high, glandular-puberulent or glabrous; leaf-blades rounded-oval or orbicular, slightly cordate or truncate at the base, 2-5 cm. wide, glabrous or minutely glandular-puberulent, with ciliate margins, round-lobed and with rounded teeth; inflorescence narrow, elongate; hypanthium together with the broadly oblong sepals about 7 mm. long. Rocky hills: Alta.—Mont.—Ore.—Wash. *Submont.* Je—Au.

18. *H. tenuifolia* (Wheelock) Rydb. Flowering branches scapiform, 4-6 dm. high, glabrous or minutely glandular-puberulent; leaf-blades reniform or rounded, deeply cordate at the base, thin, glabrous, round-lobed and crenate; hypanthium together with the oblong, obtuse sepals about 6 mm. long; petals oblanceolate, shorter than the sepals. *H. cylindrica tenuifolia* Wheelock. Hill-sides: Ida—Wash.—Ore. *Submont.* My—Au.

10. TIARÉLLA L. FALSE MITERWORT.

Perennial herbs, with scaly rootstocks and lateral leafy flowering branches. Leaves petioled; blades cordate in outline. Stipules present. Inflorescence racemose or paniculate. Hypanthium small, short-campanulate, almost free from the gynoecium. Sepals 5, ovate or lanceolate. Petals clawed, with oblong or elliptic blades, or else clawless and filiform. Stamens 10, exserted, with long filiform filaments. Gynoecium 1-celled, with 2 parietal nearly basal placentae. Capsule membranaceous, with 2 very unequal valves. Seeds few.

1. *T. unifoliata* Hook. Flowering branches 1.5-4 dm. high, glabrous or viscid-puberulent above, or slightly hirsute, 1-4-leaved; leaf-blades broadly cordate, sparingly hirsute or in age glabrate, 4-10 cm. wide, coarsely 3-5-lobed, with broadly ovate, acute, doubly crenate, mucronate teeth; inflorescence a narrow panicle; sepals whitish, ovate-oblong; petals linear-subulate, white, fully 3 times as long. Shaded ravines and woods: B.C.—Alta.—Ida.—Calif. *Mont.* My—S.

11. **HEMIEVA** Raf.

Glandular-puberulent perennials, with a very short bulbiferous rootstock and fibrous roots. Blades of basal leaves ternately divided, with crenate lobes; stem-leaves with more or less developed stipules. Flowers in a corymbiform panicle. Hypanthium campanulate, adnate to the lower half of the ovary. Sepals 5, triangular-lanceolate. Petals 5, obovate, short-clawed. Stamens 5, opposite to the sepals, erect, inserted on the outer margin of a thick disk; filaments filiform. Gynoecium half inferior, 2-celled, with axial placentae; styles distinct.

1. *H. ranunculifolia* (Hook.) Raf. Stem about 2 dm. high, more or less glandular-pubescent; lower leaf-blades ternately divided to the base, the middle division broadly cuneate, 1–2.5 cm. long, and rounded 3-lobed, the lateral ones oblique and 4-lobed; uppermost leaves sessile, 3-lobed at the apex; hypanthium about 2 mm. long; sepals about 2 mm. long; petals white or ochroleucous. *Saxifraga ranunculifolia* Hook. Wet rocks in the mountains: Alta.—B.C.—Mont.—Ore. Mont.—Subalp. Je—Jl.

12. **SUKSDÓRFIA** A. Gray.

Slender, glandular-pubescent perennials, with a bulblet-bearing rootstock; flowering shoots axial, leafy. Blades of basal leaves reniform, merely crenate; stem-leaves with stipules. Inflorescence a few-flowered panicle. Hypanthium deeply campanulate or urn-shaped, adnate to the larger portion of the gynoecium. Sepals 5, lanceolate, erect. Petals 5, long-clawed, purple or rose, occasionally lobed, imbricate. Stamens 5, opposite to the sepals; disk obsolete; anthers almost sessile. Gynoecium 2-celled, with axial, many-ovuled placentae, almost wholly inferior; style short; stigma truncate. Capsule dehiscent between the styles.

1. *S. violacea* A. Gray. Stem 2–3 dm. high, more or less glandular-pubescent; leaf-blades 1–3 cm. wide, more or less puberulent; upper stem-leaves subsessile, cuneate, and 1–4-toothed at the apex; hypanthium 2.5 mm. long, in fruit 6–7 mm. long; sepals about 2 mm. long; petals pink, 5–7 mm. long. Wet cliffs near streams: Wash.—Mont.—Ida.—Ore. Submont. Ap—Je.

13. **SULLIVÁNTIA** T. & G.

Perennial acaulescent slender herbs, with small rootstocks and scape-like stems. Leaves alternate, mostly basal, only one on the lower part of the stem; blades reniform to orbicular in outline, shallowly lobed and often coarsely toothed, cordate at the base, long-petioled. Flowers in paniced cymes. Hypanthium campanulate, longer than the calyx. Sepals 5, erect. Corolla white or whitish, regular. Petals 5, persistent, clawed. Stamens 5; filaments subulate. Ovary fully half-inferior, the carpels united up to the beaks. Follicles erect, well included in the drooping hypanthium. Seeds winged.

1. *S. Hapemanii* (Coulter & Fisch.) Coulter. Stems 1–2 dm. tall, sparingly glandular-pubescent; leaf-blades reniform or orbicular-reniform, 2–8.5 cm. in diameter, rather shallowly lobed, the lobes coarsely toothed; sepals ovate or oblong-ovate, 1.5–2 mm. long; petals 3 mm. long; follicles 4–5 mm. long. *Heuchera Hapemanii* Coulter & Fisch. *Boykinia Purpusii* Brand. *Therophon Purpusii* Heller. *S. halmicola* A. Nels. Rocky places: Wis.—Minn.—Wyo.—Colo. Mont. Jl.

14. **THÉROPHON** Raf.

Glandular-pubescent perennial herbs, with scaly rootstocks. Flowers perfect, paniculate, on leafy lateral shoots. Leaf-blades reniform, variously cleft or lobed; stipules usually present. Hypanthium adnate to the lower half of the ovary. Sepals 5, lanceolate or ovate-lanceolate. Petals 5, white, obovate or spatulate, often short-clawed. Stamens 5, with short filaments, opposite to the sepals. Ovary and capsule usually 2-celled, opening between the beaks; styles 2, distinct and in fruit forming two divergent beaks. Placentae axial; seeds numerous, with a shining minutely punctate testa. [*Boykinia* Nutt., not Raf.]

1. *T. majus* (A. Gray) Wheelock. Stems 3-10 dm. high, more or less glandular-villous with brown hairs; leaf-blades reniform in outline, glabrous, except the veins beneath, 5-15 cm. in diameter, 7-cleft about half way down, again cleft and coarsely serrate; middle stem-leaves with large foliaceous stipules; hypanthium campanulate, 2-3 mm. long, glandular-puberulent; sepals lanceolate, 3 mm. long; petals white, 5-7 mm. long. *B. occidentalis elata* A. Gray. *B. major* A. Gray. Woods: Mont.—Ida.—Wash.—s Calif. Mont. Je-S.

15. TELESÖNIX Raf.

Low glandular-pubescent perennials, with thick scaly rootstocks. Leaf-blades reniform, deeply and doubly crenate. Flowers in a contracted, leafy, somewhat secund panicle. Hypanthium turbinate-campanulate, adnate to the lower half of the ovary. Sepals 5, ovate-lanceolate. Petals 5, red or purple, with long claws. Stamens 10; filaments subulate. Ovary 3-celled; styles more or less united. Fruit dehiscent between the beaks, which are not divergent. Seeds numerous.

Petals twice as long as the sepals; blades almost orbicular; beaks of the pistils united almost to the top.
 1. *T. Jamesii*.
 Petals equalling or slightly exceeding the sepals; blades obovate-spatulate; beaks of the pistils united halfway up.
 2. *T. heucheriformis*.

1. *T. Jamesii* (Torr.) Raf. Stems usually less than 1 dm. high, glandular-pubescent; leaf-blades round-reniform, deeply and doubly crenate, 2-3.5 cm. wide, or the upper ones flabellate-cuneate, with winged petioles, or sessile; hypanthium 8 mm. long; sepals ovate-lanceolate, 4-5 mm. long; petals reddish purple. *Saxifraga Jamesii* Torr. *Boykinia Jamesii* Engler. Among rocks: Colo. Mont.—Alp. Jl.

2. *T. heucheriformis* Rydb. Closely resembling the preceding; stem 1-2 dm. high; hypanthium usually smaller, 6-7 mm. long, more hirsute; petals dark violet. *Boykinia heucheriformis* A. Nels. Rocky mountain sides: Alta.—B.C.—(Black Hills) S.D.—Wyo. Mont.—Subalp. Jl-S.

16. SAXIFRAGA (Tourn.) L. SAXIFRAGE.

Perennial caulescent herbs, from a small rootstock. Leaves alternate, not crowded, but sometimes tufted at the base of the plants; blades more or less 3-lobed, or in diminutive plants nearly entire, mostly petioled. Flowers solitary or in terminal cymes. Hypanthium turbinate or campanulate, longer than the calyx, at least at maturity. Sepals 5, erect, usually with a terminal gland. Petals 5, white, somewhat narrowed at the base, but usually clawless. Stamens 10; filaments subulate. Ovary about half-inferior, the carpels united to above the middle. Follicles well united, erect except the more or less spreading tips.

Flowers normal, none of them represented by clusters of bulblets.

Petals not abruptly narrowed into claws, leaf-blades thick, the lower ones mainly 3-lobed.
 1. *S. rivularis*.

Petals abruptly narrowed into claws; leaf-blades thin, the lower ones 5-7-lobed.
 2. *S. debilis*.

Flowers below the terminal one replaced by clusters of bulblets.

Lobes of the stem-leaves linear to triangular-lanceolate, petals cuneate.
 3. *S. cernua*.

Lobes of the stem-leaves broad and rounded, as broad as long or broader, petals fiddle-shaped.
 4. *S. simulata*.

1. *S. rivularis* L. Stems 3-8.5 cm. tall, tufted, glabrous or finely glandular-pubescent; leaf-blades reniform in outline, 3.5-12 mm. broad, thick; those of the stem-leaves sometimes entire; hypanthium 2-3.5 mm. long at maturity; sepals ovate, 1.5-2.5 mm. long, obtuse; petals oblong, 3-5 mm. long. Wet places: Greenl.—N.H.—Wyo.—B.C.—Alaska; Eurasia. Alp.—Subalp.

2. *S. debilis* Engelm. Stems 3-14.5 cm. tall, loosely tufted, glabrous or nearly so; leaf-blades suborbicular or reniform in outline, 6-17 mm. wide, thin, mainly 5-lobed; hypanthium 3-4.5 mm. long at maturity; sepals ovate, 1.5-2 mm. long, obtuse; petals cuneate to oblong, 3-7 mm. long. Wet rocks: Mont.—Wyo.—Colo.—Utah. Mont.—Alp. Je-Au.

3. *S. cernua* L. Stems 8-19 cm. tall, somewhat glandular-pubescent; leaf-blades reniform in outline, 9-23 mm. wide, prominently 5-7-lobed, the lobes linear to triangular-lanceolate; upper stem-leaves with 3-5-lobed blades; hypanthium 3.5-5 mm. long at maturity; sepals oblong to oblong-lanceolate, 3-4.5 mm. long; petals cuneate, 6-8 mm. long. Wet rocks: Greenl.—Lab.—N.M.—Utah—Alaska; Eurasia. *Alp.*—*Subalp.* Je-Jl.

4. *S. simulata* Small. Stems 9-22 cm. tall, sparingly glandular-pubescent; leaf-blades reniform or orbicular-reniform in outline, 8-21 mm. wide, 5-7-lobed, the lobes much broader than long; upper stem-leaves with 3-5-lobed blades; sepals oblong-ovate, 3-3.5 mm. long; petals fiddle-shaped, 6-7 mm. long. Wet rocks: Black Hills, S.D.—Colo. *Mont.*—*Alp.* Jl.

17. *MUSCÀRIA* Haw. SAXIFRAGE.

Perennial caulescent matted herbs, with copiously leafy caudices and sparingly leafy flower-stalks. Leaves alternate; blades 3-lobed, or rarely 5-7-lobed, narrowed at the base. Flowers solitary or few in terminal cymes. Hypanthium turbinate or campanulate, longer than the calyx, at least at maturity. Sepals 5, erect. Corolla white, regular. Petals 5, relatively broad, clawless. Stamens 10; filaments subulate. Ovary about one-half inferior, the carpels united to above the middle. Follicles erect, the tips sometimes slightly spreading.

Leaves of the caudex with entire or slightly 3-toothed blades 1. *M. adscendens*.

Leaves of the caudex with 3-cleft or prominently 3-lobed blades. 2. *M. micropetala*.

Petals less than 2 mm. long

Petals over 2 mm. long

Petals 2.5-3.5 mm. long.

Petals 4.5-7 mm. long.

Sepals oblong-lanceolate to triangular-lanceolate, hypanthium turbinate during anthesis 4. *M. monticola*

Sepals broadly ovate to half-orbicular, hypanthium campanulate during anthesis. 5. *M. caespitosa*

1. *M. adscendens* (L.) Small. Plants 2.5-11 cm. tall, somewhat glandular-pubescent; leaf-blades 3-8 mm. long, mainly cuneate to spatulate, 3-toothed, or those on the flower stalks sometimes entire; sepals ovate or oblong-ovate, 1.5-2.6 mm. long; petals cuneate to oblong-cuneate, 3-3.5 mm. long. *Saxifraga adscendens* L. *S. oregonensis* (Raf.) A. Nels. Wet rocks: Alta—Colo.—Utah—B.C.; Eu. *Alp.*—*Mont.* Jl—Au.

2. *M. micropetala* Small. Plants 2-6 cm. tall, rather copiously glandular-pubescent; leaves compactly crowded on the caudices, 5-9 mm. long, 3-lobed at the apex, the lobes linear or oblong-linear; flower stalks 1-3-flowered, each bearing 2 or 3 leaves; hypanthium about 3 mm. long at maturity; sepals broadly ovate, about 2 mm. long; petals oval or oval-obovate, about 1.5 mm. long. *S. micropetala* Fedde. High mountains: Wyo.—Utah. *Subalp.* Jl—Au.

3. *M. delicatula* Small. Plants 1-3.5 cm. tall, sparingly glandular-pubescent; leaves crowded on the caudices, 5-16 mm. long, 3-lobed at the apex, the lobes lanceolate to oblong or linear; flower-stalks slender, 1-2-flowered, each bearing 1 or 2 leaves; hypanthium 2-2.5 mm. long at maturity; sepals oblong to oblong-lanceolate, 2-2.5 mm. long, obtuse; petals oblong, 2.5-4 mm. long. *S. delicatula* Fedde. High mountains: Alta.—Colo.—Utah—B.C. *Alp.*—*Mont.* Jl—Au.

4. *M. monticola* Small. Plants 4.5-16 cm. tall, finely glandular-pubescent; leaves crowded on the caudices, 7-18 mm. long, 3-lobed at the apex, the lobes linear to oblong-ovate, acute; flower-stalks slender, 3-5-flowered, each bearing 1 to 3 leaves; hypanthium 3.5-4 mm. long at maturity; sepals 2-2.5 mm. long; petals obovate, about 4-5 mm. long. *Saxifraga ezarata* Hook. *S. monticola* Fedde. Mountains: B.C.—Mont.—Alta. *Subalp.* Jl—Au.

5. *M. caespitosa* (L.) Haw. Plants 5-16 cm. tall, glandular-pubescent; leaves crowded on the caudices; blades 8-17 mm. long, 3-lobed at the apex, the lobes lanceolate or linear; flower-stalks 3-few-flowered, each bearing 2 or 3 leaves; hypanthium 3.5-4.5 mm. long at maturity; sepals 2-3.5 mm. long; petals narrowly obovate or oblong-obovate, 5-7 mm. long. *Saxifraga caespitosa* L.

High mountains: Greenl.—Lab.—Que.—B.C.—Alaska; Eu. Alp.—Subalp. Je—Au.

18. CHONDROSEA Haw.

Perennial caulescent herbs, with a densely leafy short caudex and offsets, and sparingly leafy flower-stalks. Leaves alternate; blades serrate, each tooth terminating in an encrusted pore. Flowers in terminal compound cymes. Hypanthium turbinate to campanulate, at maturity longer than the calyx. Sepals 5, erect. Corolla white, regular. Petals 5, clawless. Stamens 10; filaments lanceolate or lanceolate-subulate. Ovary about half-inferior, the carpels united to above the middle. Follicles united to the spreading tips.

1. *C. Aizoon* (Jacq.) Haw. Stems 1–4 dm. tall; basal leaves linear-oblong to spatulate, 1.5–4 cm. long; stem-leaves few, remote, more abruptly broadened than those on the caudex; sepals ovate, 1.5–2 mm. long; petals oval, oval-obovate or oval-oblong, 3.5–4 mm. long, sessile. *Saxifraga Aizoon* Jacq. Wet rocks: Lab.—N.S.—Vt.—Sask.; Eurasia. Boreal—Subarctic. Je—Jl.

19. MICRANTHES Haw. SAXIFRAGE.

Perennial acaulescent herbs, with very short caudices and solitary or tufted scapes, sometimes bulblet-bearing at the base. Leaves basal; blades fleshy, entire or toothed. Flowers in terminal cymes disposed in narrow or broad panicles. Hypanthium rather flat, shorter than the calyx. Sepals 5, erect or reflexed. Corolla essentially regular. Petals 5, mostly white. Stamens 10. Ovary slightly inferior, the carpels partially united, often only at the base. Follicles spreading or with spreading tips

Filaments subulate or filiform-subulate, or sometimes narrowly linear

Cymules wholly or mainly aggregate into a head or spike, 1 or 2 lower ones sometimes remote or peduncled.

Petals shorter than the sepals or about equalling them

Lower cymules sessile, petals about equalling the sepals.

Lower cymules peduncled, petals shorter than the sepals.

Petals obovate to oval or orbicular-oval

Petals oblong to cuneate.

Petals larger than the sepals

Sepals ovate to triangular

Sepals oval, rounded at the apex.

Cymules in narrow pyramidal panicles.

Corolla present

Petals white

Leaves with blades narrowed into petiole-like bases.

Leaves without petiole-like bases

Panicle wide; peduncles of the lower cymules elongate.

Petals with claw-like bases.

Petals without claw-like bases

Panicle narrow, peduncles permanently very short.

Petals greenish

Corolla wanting or obsolete.

Filaments clavate or spatulate

Leaf-blades flabellate

Leaf-blades ovate, oval, broadly oblong, or orbicular

Leaf-blades narrowed at the base, neither cordate nor of an orbicular type.

Cymules permanently compact

Cymules lax and open

Leaf-blades orbicular or nearly so

Petals with elliptic-oblong or ovate blades, the claws stout.

Petals with suborbicular or reniform blades, the claws slender

1. *M. Rydbergii*.

2. *M. crenatifolia*.

3. *M. columbiana*.

4. *M. rhomboides*.

5. *M. austrina*.

6. *M. Greenet*.

7. *M. arnoglossa*.

8. *M. oregana*.

9. *M. brachypus*.

10. *M. montanensis*.

11. *M. subapetala*.

12. *M. Lyallii*.

13. *M. occidentalis*.

14. *M. saximontana*.

15. *M. aestivalis*.

16. *M. arguta*.

1. *M. Rydbergii* Small. Leaves spreading, 2–4 cm. long, oblong to ovate, obtuse, undulate or repand-dentate, glabrous or nearly so, paler beneath; scapes solitary, erect, 5–10 cm. tall, purplish, glandular-puberulent; sepals ovate or triangular-ovate; petals oblong-oval, 1–1.5 mm. long. *Saxifraga Rydbergii* Small. Mountain summit: Mont. Alp. Au.

2. *M. crenatifolia* Small. Leaves spreading, 2–3 cm. long, obovate, cuneate or orbicular-flabellate, coarsely crenate, glabrous or nearly so; scapes erect, about 15 cm. tall, closely glandular-pubescent; sepals deltoid or ovate-deltoid, obtuse; petals about 1.5 mm. long, rounded at the apex. *S. crenatifolia* Fedde. High mountains: Mont.—B.C. Mont. My—Jl.

3. *M. columbiana* (Piper) Small. Leaves 2-10 cm. long, oblong to elliptic, varying to ovate, shallowly undulate or denticulate, glabrous or nearly so on both sides; scapes erect, 1-3.5 dm. tall, rather copiously glandular-pubescent throughout; sepals ovate to oblong; petals 1.4-2 mm. long. *S. columbiana* Piper. Slopes: Wash.—Ida.—Mont.—Ore. Submont. Ap-Je.

4. *M. rhomboidea* (Greene) Small. Leaves 2-6 cm. long, ovate or rhombic-ovate, sometimes oblong-ovate, obtuse, crenate or dentate-serrate, nearly glabrous except the ciliate margins; scapes erect, 8-30 cm. high, glandular-pubescent; sepals ovate to triangular, 1.5-3.5 mm. long; petals white, obovate to oblong-obovate, 2.5-4 mm. long, commonly notched at the apex. *S. nivalis* Am. auth., not L. *S. rhomboidea* Greene. Among rocks: Mont.—Wyo.—N. M. Mont.—Alp. My-Au.

5. *M. austrina* (A. Nels.) Rydb. Leaf-blades 3-5 cm. long, ovate, elliptic, or rhomboid-ovate, crenate or entire; scape 1-3 dm. high, glandular-pubescent; sepals rounded at apex, as long as the hypanthium; petals clawed; blades rounded-obovate, 2-3 mm. long; tips of the foliicles strongly divaricate. *S. austrina* A. Nels. Damp soil: Colo. Mont. Je-Jl.

6. *M. Greenii* Blankinship. Leaves 2-6 cm. long, ovate to oblong-ovate, or oval-oblong, crenate, obtuse at the apex, ciliate or sometimes almost glabrous; scapes erect, solitary, glandular-pubescent throughout; sepals 1-2 mm. long, reflexed, ovate; petals white, 2-3 mm. long, ovate, oval, or obovate. High mountains: Mont.—Utah—Nev. Mont. Je-Jl.

7. *M. arnoglossa* (Greene) Small. Leaves 6-19 cm. long, oblong to elliptic, sometimes narrowly so, remotely glandular-denticulate, ciliate; scapes erect, 30-70 cm. tall, stout, glandular-pubescent, rather widely paniculate above; sepals broadly ovate to deltoid, 1.5-3 mm. long, eciliate; petals white, mainly oblong to elliptic, 3-3.5 mm. long. *S. arnoglossa* Greene. Hills and mountains: Mont.—Ida.—Colo. Submont.—Subalp. Je-Au.

8. *M. oregana* (Howell) Small. Leaves 3-11 cm. long, oblong or elliptic, crenulate or minutely glandular-denticulate, glabrous except the ciliate margins; scape 3-10 dm. high, densely glandular-pubescent, paniculate above; sepals ovate to semi-orbicular, about 2 mm. long; petals white, oval, 3.5-4 mm. long, clawless. *S. oregana* Howell. Wet places: Wash.—Ida.—Calif. Submont. My-Jl.

9. *M. brachypus* Small. Leaves spreading, 6-13 cm. long, oblong to elliptic, remotely glandular-denticulate, the margins ciliate; scapes solitary, 2-4 dm. tall, sparingly glandular-pubescent; sepals ovate, 1.5-2 mm. long, eciliate; petals white, oblong or nearly so, 3-3.5 mm. long, clawless. *S. brachypus* Fedde. High mountains: Colo.—Nev. Alp.—Subalp. Jl-Au.

10. *M. montanensis* Small. Leaves erect or ascending, 3.5-14 cm. long, often ovoid-oval, narrowly oblong-lanceolate and spatulate on the same plant, entire or glandular-denticulate, often sparingly pubescent; scapes erect, stout, 25-60 cm. tall, finely glandular-pubescent throughout, paniculate above; sepals ovate to triangular-ovate, 1-2 mm. long; petals greenish, nearly oblong or elliptic, 1-2.5 mm. long, clawless. *S. montanensis* Small. Mountains: Mont. Mont. Je.

11. *M. subapetala* (E. Nels.) Small. Leaves 3-17 cm. long, narrowly oblong to oblong-spatulate, the early ones relatively shorter and broader, all undulate or remotely glandular-toothed, ciliate; scapes erect, 28-50 cm. tall, thinly glandular-pubescent, narrowly paniculate above; sepals ovate, 1-2 mm. long; petals wanting or minute, oval, white or red-tinged. *S. subapetala* E. Nels. Wet slopes: Mont.—Wyo.—Ida. Mont.—Alp. Je-Au.

12. *M. Lyallii* (Engler) Small. Leaves 1.5-6.5 cm. long, flabellate, varying to suborbicular, cuneate at the base, coarsely few-toothed above, glabrous or nearly so, the petiole-like bases often longer than the blades; scapes 8-36 cm. tall, glabrous or nearly so; cymules very few-flowered, or flowers solitary; sepals ovate to oblong-ovate, 1.5-3 mm. long, glabrous, reflexed; petals white, with 2 yellow blotches below the middle, 3-4.5 mm. long, broadly oblong to suborbicular. *S. Lyallii* Engler. Along brooks: Alaska—Alta.—Mont.—B.C. Subalp. Jl-S.

13. *M. occidentalis* (S. Wats.) Small. Leaves spreading, 2-6.5 cm. long, ovate to oblong or oval, dentate or crenate-dentate, usually minutely pubescent beneath; scapes 4-19 cm. tall, copiously glandular-pubescent, very densely so above; sepals ovate, 1.5-2 mm. long, obtuse, occasionally sparingly ciliate, reflexed; petals white, 2-3.5 mm. long, rounded at the apex, oval to oval-ovate, rather abruptly narrowed below. *S. occidentalis* S. Wats. Wet places and grassy slopes: Alta.—Mont. *Submont.*—Mont. Je-Au.

14. *M. saximontana* (E. Nels.) Small. Leaves spreading, 3-9 cm. long, ovate, varying to oblong-ovate or occasionally oblong, dentate or crenate, sparingly pubescent; scapes 9-19 cm. tall, glandular-pubescent throughout, corymbosely branched; sepals ovate to oblong-ovate, 1.5-2 mm. long, sometimes ciliate, reflexed; petals white, with 2 yellow blotches, 2-3 mm. long, oval to ovate. *S. saximontana* E. Nels. Moist places: Mont.—Wyo.—Ida.—B.C. *Mont.*—*Submont.* My-Au.

15. *M. aestivalis* (Fisch. & Mey.) Small. Leaves 4-16 cm. long, the blades suborbicular to reniform, 2-5.5 cm. in diameter, coarsely few-toothed, deeply cordate at the base, glabrous or nearly so; scapes mostly erect, 9-27 cm. tall, somewhat corymbosely branched, sepals oblong to oblong-ovate, 1-1.5 mm. long, ciliate, reflexed; petals white, 3-4.5 mm. long, mostly notched at the apex; blades elliptic-oblong or ovate. *S. aestivalis* Fisch. & Mey. Along brooks and in wet places: Alaska—Alta.—Wash.; nc Siberia. *Submont*—*Mont.* Jl.

16. *M. arguta* (D. Don) Small. Leaves erect or ascending, 9-28 cm. long, the blades suborbicular to orbicular-reniform, 3-9 cm. in diameter, crenate or crenate-dentate, deeply cordate at the base, usually glabrous or nearly so; scapes 14-46 cm. tall, glabrous or somewhat glandular-pubescent near the top, paniculate above; sepals lanceolate to oblong, 1.5-2 mm. long, sometimes glandular-ciliate, reflexed; petals white, with 2 yellow blotches below the middle, 2.5-3.5 mm. long, the blades suborbicular or reniform. *S. arguta* D. Don. *S. punctata* Auth. *S. denudata* Nutt. Springy places. B.C.—Mont.—N M.—Calif. *Submont.*—*Subalp.* Jl-Au.

20. SPATULARIA Haw. SAXIFRAGE.

Perennial acaulescent herbs, with erect branching scapes from a caudex. Leaves basal; blades of a spatulate type, or broadest above the middle, toothed, at least near the apex, or rarely entire. Flowers in open cymes, sometimes changed into bulblets. Hypanthium much shorter than the calyx. Sepals 5, reflexed at maturity. Corolla irregular, white. Petals clawed, the three upper with ovate, lanceolate or sagittate blades, the two lower with elliptic or spatulate blades, or in species bearing a single terminal flower, this difference less pronounced. Filaments subulate. Ovary chiefly superior, the carpels united at the base or to below the middle. Follicles erect, with ascending or diverging tips.

Inflorescence with bulblets

Plants with all the flowers represented by clusters of bulblets, or with a single flower terminating the main axis

Plants with many flowers and some bulblets, at least with a flower terminating each branch of the stem

Inflorescence without bulblets.

1 *S. Vreelandii*

2 *S. Brunoniana*

3. *S. ferruginea*

1. *S. Vreelandii* Small. Plant 0.6-2 dm. tall, minutely glandular-pubescent; leaves crowded on the short caudex, the blades spatulate to linear-spatulate, 1.5-6 cm. long, sharply toothed near the apex or above the middle; scape loosely paniculate above or rarely with congested cymes; bracts similar to the leaves, but smaller. High mountains: B.C.—Mont.—Colo. *Submont.*—*Alp.* Au.

2. *S. Brunoniana* (Bong.) Small. Plants 1-4 dm. tall, glandular-pubescent; leaves crowded on the short caudex, the blades spatulate to oblanceolate-spatulate, 2-8 cm. long, sharply or sometimes broadly toothed above the middle; scapes rather widely paniculate; bracts much smaller than the leaves; sepals oblong-ovate to triangular-ovate, 1-1.5 mm. long; petals 3.5-6 mm. long, the 3 upper with lanceolate or oblong-lanceolate blades, the 2 lower with elliptic or spatulate-elliptic blades. *S. nootkana* Moç. *S. Bongardi* Presl. Mountain sides: Alaska—B.C.—Mont.—Ore. *Mont.*—*Subalp.* Jl-S.

3. *S. ferruginea* (Graham) Small. Plants 1–1.5 dm. tall, pubescent throughout with ultimately reddish hairs; leaves crowded on the short caudex, the blades spatulate to oblanceolate, 1.5–6.5 cm. long, prominently toothed above the middle, copiously pubescent; scapes corymbosely branched above; bracts much smaller than the leaves; sepals ovate, 1.5–2 mm. long, sparingly ciliate; petals 3.5–4 mm. long, the 3 upper with lanceolate-cordate blades, the 2 lower with elliptic or spatulate blades. *S. ferruginea* Graham. Mountains: Alaska—B.C. *Subarctic*. Jl–Au.

21. *LEPTARRHËNIA* R. Br.

Perennial caulescent herbs, with short leafy caudices. Leaves alternate, with leathery toothed blades narrowed into short petioles. Flowers in thyrsoid-paniculate cymes. Hypanthium flattened. Sepals 5, erect. Corolla regular. Petals white, persistent. Stamens 10; filaments subulate. Ovary slightly inferior; carpels almost distinct. Follicles erect, with slightly spreading tips.

1. *L. pyrolifolia* (D Don.) R. Br. Caudex horizontal, clothed with dried leaf-blades; leaf-blades oblong, 3–9 cm long, obtuse, serrate, deep green and shining above, pale beneath; floral stalks 1–5 dm. high, with 1 or 2 clasping leaves; sepals ovate, as long as the hypanthium, each with an apical gland and often with some lateral ones; petals narrowly spatulate or oblanceolate, 2–2.5 mm. long. Wet places: Alaska—Mont.—Wash. *Alp*—*Subalp*. Je–Au.

23. *LEPTÁSEA* Haw. YELLOW SAXIFRAGE, SPOTTED SAXIFRAGE.

Perennial matted caulescent herbs, with copiously leafy caudices and offsets. Leaves alternate, fleshy or parchment-like; blades entire, ciliate or rarely with 3 apical tooth-like lobes, sessile. Flowers solitary or in terminal simple or compound cymes. Hypanthium small, much shorter than the calyx. Sepals 5, often spreading or reflexed. Corolla white or yellow, regular. Petals 5, with claws. Stamens 10; filaments subulate (in all ours) or club-shaped. Ovary mostly superior, the carpels united to above the middle. Follicles erect, with spreading tips.

Leaf-blades not spine-tipped at the apex, more or less ciliate

Petals suborbicular or oval, 5–7 mm. long, each abruptly narrowed into a short claw, plant less than 6 cm. high

Petals elliptic to oblong, 9–13 mm. long, clawless, plant more than 6 cm. high

1 *L. chrysantha*.

2 *L. Hirculus*.

Leaf-blades spine-tipped at the apex

Petals oblong, oblong-lanceolate, oval, or elliptic; plants without runners.

Leaf-blades entire, with a single spine at the apex.

Leaf-blades not ciliate, fleshy, flower-stalks bearing larger leaves than the caudices

3 *L. Van-Bruntiae*

Leaf-blades ciliate, parchment-like, flower-stalks bearing smaller leaves than the caudices

4 *L. austromontana*.

Leaf-blades 3-toothed at the apex, the teeth spine-tipped

5 *L. tricuspidata*.

Petals broadly obovate, plants with runners producing an offset at the end

6. *L. flagillaris*

1. *L. chrysantha* (A. Gray) Small. Leaves of the caudices 4.5–10 mm. long, thick, spatulate, obtuse, curved, glabrous; flower-stalks 2–5.5 cm. high, sparingly glandular-pubescent, bearing few glabrous leaves; sepals ovate or oblong-ovate, 2–2.5 mm. long, somewhat glandular-ciliate, obtuse; petals golden-yellow. *Saxifraga chrysantha* A. Gray. High mountains: Colo.—N.M. *Alp*—*Subalp*. Jl–Au.

2. *L. Hirculus* (L.) Small. Leaves of the caudices 9–41 mm. long; blades flat, elliptic or elliptic-spatulate, glabrous, obtuse, often long-petioled; flower-stalks 6–30 cm. tall, more or less pubescent, mostly 1-flowered; sepals oblong to oblong-ovate, 3–4 mm. long, copiously ciliate, obtuse, reflexed at maturity; petals yellow. *S. Hirculus* L. In wet places: Greenl.—Colo.—B.C.—Alaska; Eu. *Alp*—*Subalp*. Jl–Au.

3. *L. Van-Bruntiae* Small. Leaves of the caudices 3.5–8.5 mm. long, the blades very thick, flattish, glabrous or sparingly ciliate, spine-tipped; flower-stalks 4–9 cm. tall, finely glandular-pubescent; sepals ovate to oblong-ovate,

3-3.5 mm long, glabrous; petals deep yellow, oblong, 4-4.5 mm. long, more or less crose at the apex. *S. Van-Brunhæ* Small. Along mountain streams: Alta.—B.C. *Mont.* J1-S.

4. *L. austromontana* (Wiegand) Small. Leaves of the caudices 7-14 mm. long, parchment-like, crowded, but more or less spreading, the blades narrowly lanceolate to subulate, slenderly spine-tipped, ciliate; flower-stalks 8-15 cm. tall, glabrate or finely glandular-pubescent; sepals ovate, 1.5-3 mm. long, glabrous or sparingly ciliate, obtuse; petals white, often yellow-spotted, oblong to oblong-lanceolate, 5-6.5 mm. long. *Saxifraga bronchialis* Am. auth. *S. austromontana* Wiegand. *S. cognata* E. Nels. On rocks: Alta.—B.C.—Wash.—Utah—N.M. *Submont.*—Alp. Je-S.

5. *L. tricuspidata* (Retz.) Haw. Leaves of the caudices 7.5-21 mm. long, parchment-like, crowded, spreading, the blades linear to cuneate-linear, 3-toothed, ciliate; flower-stalks 5.5-18 cm. tall, sometimes sparingly glandular-pubescent, sepals ovate, 1.5-3 mm. long, obtuse, ciliate; petals white, oblong-elliptic to oval; 6-7 mm. long. *S. tricuspidata* Retz. Arctic regions or high mountains: Greenl.—Lab.—Mich.—Alta.—Alaska. *Arctic-Alp.* J1-Au.

6. *L. flagellaris* (Willd.) Small. Leaves of the caudices 7-16 mm. long, crowded, more or less spreading, some of them subtending slender arching offsets, the blades cuneate, oblong-cuneate or spatulate, spine-tipped, glandular-ciliate; flower-stalks 4-15 cm. tall, glandular-pubescent, 1-few-flowered; sepals ovate or oblong-ovate, 4-5.5 mm. long, glandular-ciliate, obtuse; petals yellow, cuneate or obovate, 6.5-9 mm. long. *S. flagellaris* Willd. Alpine-arctic situations: Greenl.—N.M.—Ariz.—Alaska; Eurasia. *Alp.*—*Subalp.* J1-Au.

23. HETERÍSIA Raf.

Perennial caulescent herb with a short caudex. Leaves alternate, but approximate, mostly near the base, with thin membranous stipules; blades somewhat fleshy, palmately lobed; lobes 3-toothed. Flowers in open cymes, often replaced by bulblets. Hypanthium flat. Sepals 5, ovate to oblong, strongly reflexed. Corolla white, regular; petals 5, ovate with a narrow claw. Stamens 10; filaments clavate. Ovary slightly inferior, the carpels united below the middle. Fruit nodding, the tips of the follicles spreading or slightly recurved.

1. *H. Mertensiana* (Bong.) Small. Leaves 4.5-21 cm. long, the blades suborbicular to reniform, deeply cordate at the base, glabrous, shallowly lobed, the lobes usually broadly 3-toothed; scapes 11-32 cm. tall, sparingly pubescent, bright green, paniculately branched; eymules mainly reduced to bulblets along the slender peduncles, terminating in a single flower; sepals oblong to oblong-ovate, 2-3 mm. long, sometimes glandular-eriolate, usually glabrous, reflexed; petals white, 3-4 mm. long. *Saxifraga Mertensiana* Bong. *S. heterantha* Hook. Mountains: Alaska—Alta.—Mont.—Ida.—Calif. *Mont.* My-J1.

24. ANTIPHÝLLA Haw. PURPLE OR MOUNTAIN SAXIFRAGE.

Perennial caulescent densely matted herbs, with copiously leafy stems and sterile branches, and naked or sparingly leafy flower-stalks. Leaves opposite, except sometimes on the flower-stalks, often 4-ranked, imbricate; blades relatively broad, conspicuously ciliate, mostly with an almost apical pore, keeled, sessile. Flowers solitary, erect. Hypanthium shorter than the calyx. Sepals 5, strongly ciliate. Corolla regular; petals 5, blue or purple, much longer than the sepals, narrowed into claw-like bases. Filaments subulate to triangular. Ovary more than half superior, the carpels united to above the middle. Follicles erect, with more or less spreading tips.

1. *A. oppositifolia* (L.) Fourr. Plants in dense mats; leaves densely imbricate, 4-ranked, the blades obovate to spatulate, 3-5 mm. long, ciliate, keeled; flower-stalks 1-3 cm. long, leafy; sepals oblong to ovate, 2.5-3 mm. long, ciliate all around; petals elliptic to oval, 8-9 mm. long. *Saxifraga oppositifolia* L. Rocks and stony places: Greenl.—Vt.—Wyo.—B.C.—Alaska; Eurasia. *Mont.*—Alp. Je-Au.

FAMILY 58. **HYDRANGEACEAE.** HYDRANGEA FAMILY.

Shrubs or trees, or rarely vines. Leaves opposite, without stipules. Flowers commonly perfect, in cymes. Hypanthium well developed, usually ribbed. Sepals 4–10. Petals as many. Stamens from 8 to many. Gynoecium of 2–5, rarely 10, united carpels. Ovary partly or wholly inferior; styles distinct or united, sometimes wanting. Fruit a capsule.

Capsule obovoid or obconic, the beaks rising abruptly from the body

Capsule conic or ovoid, the beaks tapering gradually from the body.

Filaments and anthers unappendaged, sepals and petals 5.

Leaf-blades toothed, hypanthium short during anthesis.

Leaf-blades entire, hypanthium long during anthesis.

Filaments appendaged under the anthers; anthers appendaged and petals 4.

1. PHILADELPHUS.

2. EDWINIA.

3. FENDLERELLA

4. FENDLERIA.

1. **PHILADELPHUS** L. MOCK ORANGE, SYRINGA.

Branching shrubs. Leaves toothed or entire. Flowers perfect, borne at the ends of short leafy branches, solitary or in cymes. Sepals 4, rarely 5, valvate, persistent, more or less tomentose within. Petals 4, rarely 5, convolute, white or ochroleucous. Stamens usually many, 25–60; filaments flat, subulate, free or more or less united below; anthers short, didymous. Ovary at least two-thirds inferior and adnate to the hypanthium, 4-celled; styles elongate, distinct or more or less united; stigmas distinct or more or less united. Ovules numerous, pendulous. Capsule more or less woody, loculicidal, the septa separating in the center. Seeds numerous; coat reticulate; albumen fleshy.

Leaf-blades thin, not leathery, usually toothed or denticulate, more than 3 cm long; flowers several

Petals ovate-lanceolate, acute or obtuse at the apex.

Petals oblong to rounded-oval, rounded at the apex.

Leaf-blades 3–5-ribbed, the lateral ribs or if 5-ribbed the second or stronger pair meeting the midrib some distance from the base of the blade

Bark of the second season red or chestnut-brown, with conspicuous cross-cracks, at last peeling off

Bark of the second season gray or yellowish, neither cross-cracked nor peeling off

Leaf-blades 5-ribbed, all ribs originating at the base of the blade

Leaf-blades small, 0.5–2 cm. long, entire; flowers mostly solitary.

Hypanthium 4–5 mm. high.

Hypanthium about 2 mm. high, or in fruit 3–4 mm. high.

Styles wholly united or nearly so, stigmas sometimes also partly united

Styles distinct for at least half their length; stigmas distinct

1 *P. Helleri*

2 *P. Lewisii*

3 *P. columbianus*.

4 *P. Gordontianus*

5 *P. microphyllus*

6 *P. occidentalis*.

7 *P. minutus*

1. ***P. Helleri*** Rydb. Shrub 2–3 m. high, with ascending branches; bark of the young branches brownish, glabrous, and of the second year yellowish or gray, not exfoliating; leaf-blades ovate or lance-ovate, denticulate or rarely entire, 4–7 cm. long, glabrous, or sparingly hairy along the veins beneath; flowers 5–11, falsely racemose; sepals 7–8 mm. long, short-acuminate; petals white, 15–18 mm. long; styles united to near the apex. Hills: Ida. *Submont.* Jl.

2. ***P. Lewisii*** Pursh. Shrub 1–2 m. high, with ascending branches; bark of the young twigs red, glabrous; leaf-blades ovate-lanceolate or ovate, glabrous above, hairy on the veins and in their axils beneath, entire or denticulate; sepals lance-ovate, abruptly acuminate; petals white, 10–15 mm. long; styles united half their length; capsule about 1 cm. long. (?) *P. intermedius* A. Nels. River banks and hills: B.C.—Mont.—Ida.—Ore. *Submont.*—Mont. My—Jl.

3. ***P. columbianus*** Koehne. Shrub 2–3 m. high, with ascending branches; bark of the young twigs mostly yellowish, glabrous or pubescent; leaf-blades lanceolate to ovate, more or less acuminate, denticulate or entire, more or less hairy on both sides; flowers 3–9, falsely racemose; sepals lance-ovate, acuminate; petals white, 15–20 mm. long; styles united half their length; capsule about 12 mm. long, somewhat 4-angled below. River banks and coves: B.C.—Ida.—Calif. *Submont.* My—Jl.

4. *P. Gordonianus* Lindl. Shrub 2-4 m. high, with ascending branches; bark of the young twigs red or chestnut, at first slightly pubescent, that of the second year grayish, not exfoliating; leaf-blades ovate, more or less acuminate at the apex, rounded or subcordate at the base, usually coarsely dentate, more or less pubescent on both sides; sepals lance-ovate, abruptly acuminate; petals white, 15-20 mm. long; styles usually united to near the apex; capsule 8-10 mm. long, abruptly contracted below. Hills and along streams: B.C.—Ida.—Calif. *Submont.* My-Jl.

5. *P. microphyllus* A. Gray. Shrub 5-15 dm. high, with ascending branches; bark of the young twigs brown, strigose, exfoliating the second year; leaf-blades oblong or oblong-lanceolate, entire, leathery, 1-3 cm. long, shining and glabrous or strigose above, pale and strigose beneath; sepals ovate, 5-6 mm. long, glabrous or strigose without; petals white, about 15 mm. long, obovate; stamens about 40; styles united; stigmas oblong, often more or less united; capsule about 8 mm. long. Dry hills and among cliffs: N.M.—Colo.—Ariz. *Submont.* Je-Jl.

6. *P. occidentalis* A. Nels. Shrub 5-10 dm. high, with spreading branches; bark of the young twigs brown, hirsute-strigose, exfoliating the second year; leaf-blades oblong or elliptic-ovate, entire, 1-2 cm. long, strigose on both sides, paler beneath, less shining than in the related species; hypanthium strigose; sepals ovate, usually acute; capsule 6-7 mm. long. Cañons and hillsides: Utah—Wyo.—Colo. *Submont.* Jl-Au.

7. *P. minutus* Rydb. Shrub about 1 m. high, with divergent branches; bark of the twigs brown and finely strigose, exfoliating the second year; leaf-blades oblong, 8-18 mm. long, leathery, densely hirsute-strigose beneath, slightly so or glabrous and shining above; hypanthium strigose or rarely glabrate; sepals about 5 mm. long, ovate; petals obovate, 10-12 mm. long. *P. nitidus* A. Nels. Cañons: Colo.—Utah. *Son.—Submont.* Je.

2. EDWINIA Heller.

Shrubs, with erect terete branches; bark exfoliating. Leaves opposite, toothed, pubescent at least beneath. Flowers perfect, cymose, rather large. Hypanthium turbinate, becoming hemispheric. Sepals 5. Petals 5, convolute, with a claw-like base, white, pubescent within. Stamens 10; filaments narrow, subulate; anther didymous. Ovary conic, partially 3-5-celled; styles 3-5, distinct; stigmas terminal. Ovules numerous. Capsule half-inferior, with a rounded base, 3-5-valved; beaks slender. [*Jamesia* T. & G., not Raf.]

Sepals slightly longer than the hypanthium at maturity.

Sepals several times longer than the hypanthium at maturity.

1. *E. americana*.

2. *E. macrocalyx*.

1. *E. americana* (T. & G.) Heller. Shrub 0.5-2 m. high; bark of young twigs brown, pubescent; leaf-blades oval or suborbicular, 1.5-6 cm. long, serrate, finely pale- or white-tomentose beneath; hypanthium during anthesis turbinate, becoming 2-3 mm. long; sepals acute, becoming 2-3 mm. long; petals cuneate; body of capsule 4-4.5 mm. long, rounded at the base. *Jamesia americana* T. & G. Cliffs: N.M.—Wyo.—Utah. *Submont.—Mont.* My-Jl.

2. *E. macrocalyx* Small. Shrub less than 1.5 m. high; young twigs finely pubescent, pale red; leaf-blades oval or ovate, 1-2.5 cm. long, serrate, pale-strigose beneath; hypanthium flattish in anthesis, becoming 3-3.5 mm. long and turbinate-campanulate in fruit; sepals acute, becoming 5-6 mm. long; petals white, obovate; body of capsule 4-5 mm. long, narrowly turbinate at the base. Cliffs: Utah. *Mont.—Subalp.* Au.

3. FENDLERELLA Heller.

Shrubs low and depressed, with somewhat shreddy bark. Leaves opposite, entire, nearly sessile. Flowers perfect, small, in compound cymes. Hypanthium turbinate-campanulate, becoming turbinate. Sepals and petals 5, the latter white, narrowed into broad claws, entire. Stamens 10, alternately longer and shorter; filaments subulate; anthers didymous. Ovary conic, 3-celled; styles 3, distinct; stigmas slightly introrse. Ovules several in each cavity. Capsule

half-inferior, narrowed at both ends, 3-valved, septicidal. Seeds solitary in each cavity.

1. **F. utahensis** (S. Wats.) Heller. A diffuse shrub, usually less than a meter high; branches, leaves, and young parts strigillose; leaf-blades oblong or elliptic to oblong-spatulate, 6-16 mm. long; hypanthium pubescent; sepals lanceolate, 1-1.5 mm. long, ciliate; petals oblong or elliptic, 3-4 mm. long; body of capsule 4 mm. long. Cañons and cliffs: Utah—Nev.—Ariz. *Submont.*—*Mont.* Jl.

4. **FÉNDLERA** Engelm. & Gray.

Shrubs, with exfoliating bark, becoming striate. Leaves opposite, deciduous, entire, 3-ribbed, sessile or nearly so. Flowers solitary or 2 or 3 together, perfect, rather large. Hypanthium turbinate, 8-ribbed. Sepals 4, valvate. Petals 4, white, clawed, with ovate-deltoid, crose blades. Stamens 8; filaments flattened, with 2 narrow appendages; connective prolonged beyond the anthers, which are slightly elongate. Ovary 4-celled, styles 4, distinct; stigmas minute, nearly terminal. Ovules numerous, pendulous. Capsule less than half inferior, septicidal. Seeds few in each cavity.

Hypanthium and lower surface of the leaves strigose, the upper surface hispidulous

Hypanthium and leaves sparingly strigose or glabrous.

1. *F. tomentella*.

2. *F. falcata*

1. **F. tomentella** Thornber. Shrub 1-1.5 m. high, with reddish or straw-colored, pubescent twigs; leaves lanceolate, 1.5-3 cm. long, dull green, strongly 3-ribbed; petals 15-20 mm. long; capsule 10-12 mm. long. *F. rupicola* of Fl. Colo. Among rocks: N.M.—Colo.—Utah—Ariz. *Son.*—*Submont.* Ap—Au.

2. **F. falcata** Thornber. Shrub 1.5-2 m. high, with reddish, glabrate twigs; leaves 1.5-4 cm. long, lanceolate, often narrowly so, revolute on the margins; pedicels and hypanthium glabrous or sparingly strigose and glabrate; petals 17-22 mm. long, capsule 11-16 mm. long. Mountains: N.M.—Colo. *Son.*—*Mont.* My—Jl.

FAMILY 59. **GROSSULARIACEAE.** GOOSEBERRY FAMILY.

Shrubs, with palmately veined leaf-blades; stipules none or adnate to the petioles. Inflorescence racemose. Flowers regular, perfect. Hypanthium more or less developed, from saucer-shaped to tubular. Sepals 5, rarely 4. Petals as many as the sepals, small. Stamens as many as and alternate with the petals, inserted in the mouth of the hypanthium. Gynoecium of 2 united carpels; ovary 1-celled, with 2 parietal placentae, inferior; styles 2. Fruit a pulpy berry.

Leaf-blades plicate (folded like a fan) in vernalion, flowers regular; style not inclined

Plant armed with nodal spines and usually also bristly

Pedicels not jointed near the flowers, bractlets if present enclosed in the bract; hypanthium-tube well developed, deeply campanulate to cylindric

1. **GROSSULARIA**

Pedicels jointed below the short stipe-like base of the flower, bearing the bractlets just below the node; hypanthium-tube short, saucer-shaped

2. **LIMNOCOTRYA**

Plant unarmed; pedicels jointed just under the flowers; bractlets if present borne just under the node

3. **RIBES**

Leaf-blades convolute (rolled in) in vernalion, flowers slightly irregular, styles somewhat declined

4. **CHRYSOBOTRYA**

1. **GROSSULARIA** (Tourn.) Mill. GOOSEBERRIES.

Shrubs, normally armed with simple or 3-forked nodal spines. Leaves in ours rounded or reniform, or more or less pentagonal in outline, 3-5-cleft and crenate or dentate. Flowers bracteate in few-flowered racemes; pedicels not jointed. Hypanthium distinctly produced beyond the ovary; tube campanulate to cylindric. Fruit a berry, with rather tough skin, in ours smooth, only somewhat glandular-hispid in *G. setosa*, but in species from other regions often spiny.

- Sepals white; filaments more than twice as long as the petals, style pubescent below
 Filaments and anthers glabrous; ribs of the leaves distinct to the base
 1 *G. missouriensis*
 Filaments and usually also the anthers hairy; ribs of the leaves united at the base
 on the lower surface 2 *G. nivea*
 Sepals mostly green or purplish; filaments not more than twice as long as the petals.
 Tube of the hypanthium externally glabrous, styles hairy towards the base
 Hypanthium-tube cylindric, usually longer than the sepals. 3 *G. setosa*.
 Hypanthium-tube campanulate or turbinate, not longer than the sepals
 Stamens equalling the petals.
 Peduncles well exerted from the bud-scales; hypanthium and sepals to-
 gether 8-10 mm. long 4 *G. irrigua*
 Peduncles and pedicels together scarcely longer than the bud-scales, hypan-
 thium and calyx together 5-7 mm. long 5 *G. oxyacanthoides*.
 Stamens about twice as long as the petals.
 Peduncles glabrous, bracts glabrous 6 *G. inermis*.
 Peduncles puberulent and often glandular; bracts pubescent and glandular-
 ciliate 7 *G. Purpurea*
 Tube of the hypanthium pubescent, styles wholly glabrous, stamens about equalling
 the petals
 Length of the flowers 8 mm. or more, tube of the hypanthium cylindric, not shorter
 than the sepals. 8 *G. leptantha*
 Length of the flower 7 mm. or less, tube of the hypanthium campanulate, shorter
 than the sepals 9 *G. velutina*.

1. *G. missouriensis* (Nutt.) Cov. & Britt. A shrub 1-2 m. high, with glabrous branches; spines reddish brown, 1-2 cm. long, straight; leaf-blades 2-6 cm. broad, thin, sparingly pubescent or glabrous above, densely pubescent beneath; peduncles slender, longer than the petioles; hypanthium cylindric, pubescent, about 2.5 mm. long, greenish; sepals linear, 2-3 times as long as the hypanthium, greenish white; petals much shorter than the sepals, crose; berry purple or brownish, about 1 cm. in diameter. *Ribes missouriense* Nutt. River banks: Ill.—Tenn.—Kans.—S D. *Plain.* Ap—Je.

2. *G. nivea* (Lindl.) Spach. A shrub 1-3 m. high; branches glabrous, reddish or brown; spines 1-3, stout, brown, 1-2 cm. long; leaves sparingly pubescent or glabrate; peduncles nodding, shorter than the leaves; hypanthium campanulate, white, about 2 mm. long; sepals white, narrowly lanceolate, 6-8 mm. long; petals white, cuncate, erose; berry glabrous, bluish black, about 8 mm. thick. *R. niveum* Lindl. River banks: Wash.—Ida.—Nev.—Ore. *Son.—Submont.* Ap—My.

3. *G. setosa* (Lindl.) Cov. & Britt. A shrub, usually less than 1 m. high, with bristly branches; spines subulate, usually less than 1 cm. long; leaf-blades thin, cordate or truncate at the base, 1-4 cm. wide, finely pubescent; peduncles shorter than the leaves, hypanthium-tube 5-8 mm. long, about twice as long as the white sepals; petals one-half to two-thirds as long as the sepals and as long as the stamens; berry red to black, somewhat bristly or smooth, 8-12 mm. in diameter. *R. setosum* Lindl. *R. saximontanum* F. Nels. Plains and hills: Sask.—Neb.—Colo.—Ida.—Alta. *Plain.—Submont.* Ap—Je.

4. *G. irrigua* (Dougl.) Cov. & Britt. A shrub 1-3 m. high; young shoots usually pubescent; spines subulate, about 1 cm. long; leaf-blades thin, 3-7 cm. wide, glabrous or nearly so above, pubescent and minutely glandular beneath; peduncles nodding, shorter than the leaves; hypanthium greenish, glabrous, 3-4 mm. long; sepals greenish white, 5-8 mm. long; petals obovate, white, about half as long as the sepals; berry smooth, globose, 7-13 mm. in diameter. *R. irriguum* Dougl. Mountains: B.C.—Mont.—Ida.—Ore. *Submont.* My—Je.

5. *G. oxyacanthoides* (L.) Mill. A low shrub, less than 1 m. high, usually very bristly; spines subulate, rather strong, 1 cm. long or less; leaf-blades 2-4 cm. broad, cordate or broadly cuncate at base, more or less pubescent, somewhat glandular; pedicels also very short; hypanthium greenish white, glabrous; sepals white, glabrous, 2.5-4 mm. long, a little longer than the hypanthium; petals obovate, two-thirds as long as the sepals; berry smooth, about 1 cm. in diameter. *R. oxyacanthoides* L. Copses: Hudson Bay—Mich.—Mont.—B.C.—Yukon. *Boreal—Submont.* My—Je.

6. *G. inermis* (Rydb.) Cov. & Britt. Shrub with glabrous stem; nodal spines few, 1 cm. long or less, or none; leaves truncate or cordate at the base, glabrous or somewhat puberulent and glandular; peduncles exerted but short,

glabrous, 1-4-flowered; bract small and glabrous; hypanthium glabrous; tube 2.5-3.5 mm. long, a little longer than the glabrous sepals; berry red-purple, glabrous, about 8 mm. thick. *R. inerme* Rydb. *R. vallicola* Greene, a more pubescent form. Mountains: B.C.—Alta.—N.M.—Utah—Calif. *Submont.*—*Mont.* My-Jl.

7. *G. Purpusi* (Koehne) Rydb. Shrub with fine puberulent branches; nodal spines 1 cm. long or less; leaves mostly truncate at the base, decidedly pubescent and slightly glandular; peduncles short; hypanthium glabrous; tube about 3 mm. long, as long as the sepals, which usually bear a few scattered hairs on the lower side; berry glabrous, purple. *R. Purpusi* Koehne. Mountains: Colo.—N.M. *Submont.* My-Je.

8. *G. leptantha* (A. Gray) Cov. & Britt. A shrub 1-2 m. high, the branches sometimes bristly; spines 0.5-1.5 cm. long; leaves reniform-orbicular in outline, crenate-dentate, truncate at the base, 0.5-2 cm. broad, glabrous or pubescent on both sides; peduncles 1-2-flowered, shorter than the leaves; pedicels very short; hypanthium greenish, 4-6 mm. long, about half as thick; sepals greenish white, pubescent; petals spatulate, white or pinkish, about half as long as the sepals; berry 6-8 mm. in diameter. *R. leptanthum* A. Gray. Mountains: N.M.—Colo.—Ariz.—Utah. *Submont.*—*Mont.* Ap-Je.

9. *G. velutina* (Greene) Cov. & Britt. A shrub 1-2 m. high; young shoots finely pubescent but not bristly; spines 0.5-2 cm. long, straight or slightly curved; leaf-blades crenate, 1-1.5 cm. broad, cordate or truncate at the base, finely pubescent on both sides; hypanthium about 2 mm. long and 3 mm. thick; sepals yellow, about 3 mm. long; petals oblong or obovate, yellow, 2-2.5 mm. long; berry yellow, about 7 mm. thick. *R. leptanthum brachyanthum* A. Gray. *R. velutinum* Greene. Mountains: Ore.—Utah—Ariz.—Calif. *Sen.*—*Submont.* Ap-Jl.

2. LIMNOBOTRYA Rydb. SWAMP CURRANTS.

Shrubs, armed with pectinately divided nodal spines, usually also bristly. Leaves more or less pentagonal in outline, palmately veined and quinately-cleft and incised or toothed. Flowers perfect, usually several, in bracted racemes; pedicels jointed just under the short stipe-like base of the flower, usually with 2 minute bractlets just below the node. Hypanthium slightly produced beyond the ovary; tube saucer-shaped. Sepals 5, ascending, oval or rounded. Petals reniform-flabellate, clawed, erect. Stamens not exceeding the petals. Fruit a currant-like berry.

Leaves glabrous or nearly so; fruit black.

Lobes of the leaves acute, incised, the terminal one decidedly longer; basal sinus open; stem usually densely bristly.

Nodal spines scarcely stronger than the bristles; stipitate base of the flowers almost obsolete; peduncle and ovary densely glandular and the former also finely villous. 1. *L. lacustris*.

Nodal spines usually much stronger than the bristles; stipe-like base of the flowers evident, 0.5-1 mm. long, peduncles and ovary sparingly glandular, but not at all villous. 2. *L. echinata*.

Lobes of the leaves obtusish, toothed, the terminal one scarcely longer; basal sinus usually narrow; stem except in depauperate forms usually only slightly bristly; stipe-like base of the flower about 0.5 mm. long; peduncles glandular and sometimes puberulent. 3. *L. parvula*.

Leaves pubescent and glandular on both sides; fruit bright red. 4. *L. montigena*.

1. *L. lacustris* (Pers.) Rydb. Shrub 1-2 m. high; spines and bristles slender, 2-4 mm. long; petioles ciliate; leaf-blades 2-5 cm. long, cleft about three-fourth their length; divisions rhombic, incised into oblong acute teeth; flowers 4-10, light green or purplish; stamens shorter than the petals; berry 6-8 mm. in diameter; densely glandular-hispid. *Ribes lacustre* (Pers.) Poir. Swamps: Newf.—Mass.—Pa.—(Black Hills) S.D.—Mack. *Boreal*—*Submont.* My-Jl.

2. *L. echinata* (Lindl.) Rydb. Shrub 1-2 m. high; spines usually comparatively stout, 3-8 mm. long and bristles fine and numerous; leaves as in the preceding; peduncles and ovary often almost glandless; bractlets about 0.5 mm. long; flowers 6-20, often purplish; stamens usually equalling the petals; berry 8-10 mm. in diameter, sparingly glandular-hispid or glabrous. *R. echinatum* Lindl. Swamps: Alaska—Mont.—Ida.—n Calif. *Submont.* My-Jl.

3. *L. parvula* (A. Gray) Rydb. Low shrub, 1 m. high or less; spines slender, 2-4 mm. long, rarely much stronger than the bristles; leaves usually fully as broad as long, cleft about two-thirds to the base; flowers usually purplish, 4-8 in the raceme; stamens equalling the petals; berry 8-10 mm. in diameter, usually densely glandular-hispid. *R. lacustre parvulum* A. Gray. Mountains, among rocks and along streams: Yukon—Alta.—Colo.—Utah. *Mont.—Alp.* My—Au.

4. *L. montigena* (McClatchie) Rydb. A straggling shrub, 3-6 dm. high; stems with short stout nodal spines, and more or less bristly; leaves 1-4 cm. wide, reniform, pubescent, the divisions obovate to elliptic, incised; racemes rather short and few-flowered; tube of the hypanthium glandular-bristly; sepals 3-4 mm. long, veiny; berry densely glandular-bristly. *R. lacustre molle* A. Gray. *R. lentum* (M. E. Jones) Cov. & Rose. *R. montigenum* McClatchie. High mountains: N.M.—Calif.—B.C.—Mont. *Mont.—Alp.*

3. RIBES L. CURRANTS.

Unarmed shrubs. Leaves alternate, palmately veined and usually also palmately lobed, plicate in veneration, mostly deciduous. Inflorescence several-to many-flowered; pedicels jointed beneath the flowers, a pair of small bractlets often present at the node. Flowers perfect or in some exotic species dioecious. Hypanthium-tube more or less developed, from saucer-shaped to cylindric. Fruit a berry, with rather thin skin, with or without glands, never spiny, disarticulating from the pedicel.

Hypanthium-tube rather poorly developed, saucer-shaped or open-campanulate.

Berry not glandular-hispid.

Berry red, without glands; racemes drooping, bracts short-ovate.

1. *R. triste*.

Berry black, with sessile glands; racemes erect, bracts subulate-linear.

Racemes 6-12-flowered, bracts 2-5 mm. long; leaves firm, villous-pubescent beneath, with a shallow or no basal sinus

2. *R. hudsonianum*.

Racemes 25-50-flowered; bracts minute, 1-2 mm. long; leaves thin, essentially glabrous, usually with a deep basal sinus.

3. *R. petiolare*.

Berry glandular-hispid.

Berry red; sepals 2-2.5 mm. long, glabrous without.

4. *R. glandulosum*.

Berry black or dark-purple; sepals 3-4 mm. long, hairy without

5. *R. laxiflorum*.

Sepals without gland-hairs, berry with a bloom.

6. *R. coloradense*

Sepals with gland-hairs; berry without a bloom.

Hypanthium-tube well developed, deeply campanulate to tubular.

7. *R. americanum*.

Fruit glabrous, black.

Fruit glandular-hispid

Hypanthium-tube campanulate or urceolate, fruit black or blue.

Leaves glabrous or essentially so, fruit globose, with a bloom.

Hypanthium-tube greenish white, about 1 mm. long, less than half as long as the sepals

8. *R. Wolffii*.

Hypanthium-tube rose-colored or purplish, about 2 mm. long, more than half as long as the sepals.

9. *R. nevadense*.

Leaves pubescent and usually very glandular; fruit ellipsoid, without a bloom.

10. *R. viscosissimum*.

Hypanthium-tube cylindric, fruit red

Leaves merely glandular-pruinose, not hairy; flowers whitish

11. *R. rentiforme*.

Leaves decidedly pubescent as well as glandular.

Bracts cuneate-obovate, the rounded or truncate summit several lobed; flowers whitish; styles pubescent.

12. *R. cereum*.

Bracts oblong or rhombic, entire or glandular-dentate, flowers pinkish; styles glabrous

13. *R. inebrians*.

1. *R. triste* Pall. A shrub about 1 m. high; leaf-blades thin, reniform-orbicular, 6-10 cm. wide, usually 3-lobed, rarely 5-lobed, dark green and glabrous above, pale and pubescent or glabrate beneath, with conspicuous veins and coarsely dentate-serrate lobes, cordate or rarely truncate at the base; racemes somewhat glandular, usually shorter than the leaves; flowers more or less purplish; sepals obtuse, spreading; berry smooth, glabrous, red, 6-8 mm. in diameter. *R. albinerium* Michx. *R. rubrum* A. Gray, not L. Woods: Newf.—N.J.—S.D.—Ore.—Alaska. *Boreal.—Submont.* My—Je.

2. *R. hudsonianum* Richards. A shrub 1-1.5 m. high; leaf-blades reniform, broader than long, 3-10 cm. wide, more or less pubescent and resinous-dotted, their lobes ovate, obtuse or acutish, coarsely dentate; racemes 3-6 cm.

long, loosely flowered; bracts setaceous, nearly equalling the pedicels; sepals oval, obtuse, spreading; fruit globose, glabrous, 5-10 mm. in diameter. Wooded places: Hudson Bay—Ont.—Minn.—Mont.—B.C.—Alaska. *Boreal.*—*Mont.* My—Je.

3. *R. petiolare* Dougl. A shrub 1-1.5 m. high; leaf-blades cordate, mostly 5-lobed, thin, glabrous or slightly pubescent when young, resinous-dotted beneath; the lobes ovate, acute, sharply serrate; racemes erect, 5-12 dm. long; pedicels 3-6 mm. long, much longer than the subulate bracts; sepals white, ovate, obtuse, puberulent, 7 mm. long; berry subglobose, without bloom, about 1 cm. in diameter. Wooded mountain sides: B.C.—Ore.—Utah—Wyo.—Alta. *Submont.*—*Mont.* My—Jl.

4. *R. glandulosum* Grauer. A shrub, with decumbent or spreading branches, 1 m. long or less; leaf-blades thin, fetid, glabrous above, puberulent on the veins beneath, orbicular in outline, cordate at the base, 3-8 cm. wide, deeply 5-7-lobed, the lobes ovate, acute, incised-serrate; racemes 8-12-flowered, ascending, shorter than the leaves, puberulent; pedicels much longer than the narrow, glandular bracts; tube of the hypanthium short-campanulate; sepals 2-2.5 mm. long, pubescent without; fruit 6-8 mm. in diameter. *R. prostratum* L'Her. Woods: Newf.—N.C.—Wis.—B.C.—Mack. *Boreal.* My—Je.

5. *R. laxiflorum* Pursh. A shrub, with decumbent stems and puberulent young shoots; leaf-blades suborbicular in outline, cordate at the base, 5-10 cm. wide, thin, deeply 5-lobed, glabrous above, somewhat puberulent beneath, the lobes ovate, serrate; racemes erect-spreading, 6-12-flowered, pubescent and glandular; pedicels much longer than the lanceolate bracts; petals fan-shaped. Woods: Alaska—Alta.—Ida.—n Calif. *Mont.* My—Jl.

6. *R. coloradense* Coville. A shrub, with decumbent or procumbent stems; leaf-blades thin, broader than long, 5-8 cm. wide, deeply cordate at the base, mostly 5-lobed, glabrous above, sometimes sparingly pubescent on the veins beneath, and with minute glands, the lobes ovate or triangular, irregularly crenate-dentate; raceme erect, puberulent and glandular; pedicels longer than the linear-lanceolate bracts; sepals greenish or purplish, 3-4 mm. long, spreading; petals purplish, fan-shaped; berry black, about 1 cm. in diameter. Mountains: Colo.—N.M.—Utah. *Mont.*—*Subalp.* Je—Jl.

7. *R. americanum* Mill. A shrub 1-1.5 m. high; young shoots somewhat pubescent and glandular-dotted; leaves suborbicular in outline, cordate at the base, with an open sinus, 3-8 cm. broad, glabrate above, more or less pubescent (at least on the veins) and glandular-dotted beneath, with ovate serrate-dentate lobes; petioles long-ciliate towards the base; bracts linear or linear-lanceolate; hypanthium urceolate-cylindric, 3-4 mm. long, greenish, sparingly pubescent; sepals obtuse, a little longer than the hypanthium; petals oblong, greenish, two-thirds as long; fruit 6-10 mm. in diameter. *R. floridum* L'Her. Thickets and damp woods: N.S.—Va.—N.M.—Alta. *Plain*—*Submont.* My—Je.

8. *R. Wolfii* Rothr. A shrub 1-3.5 m. high, glabrous, or the young shoots finely pubescent; leaves suborbicular in outline, cordate at the base, with an open sinus, 3-5-lobed, 4-9 cm. broad; lobes acute or obtuse, serrate-dentate; racemes erect, few-flowered, puberulent and glandular; bracts oblong or oblong-spatulate; hypanthium puberulent, 1.5 mm. long; sepals greenish-white, ovate-oblong, 3-4 mm. long, spreading; petals white, spatulate, much shorter than the sepals; berry black, 8-12 mm. in diameter. Mountains: Colo.—N.M.—Ariz.—Utah. *Submont.*—*Subalp.* My—Je.

9. *R. nevadense* Kellogg. A shrub, glabrous, or the young shoots puberulent; leaves thin, paler beneath, sparingly pubescent or glabrate, orbicular, with obtuse crenate lobes, cordate or truncate at the base, 4-7 cm. broad, long-ciliate towards the base; racemes nodding; bracts thin, pink or greenish, obtuse or acutish, glandular-ciliate; sepals rose-colored; petals white, orbicular to oblong; berry blue, 8 mm. in diameter. Mountains: Calif.—Nev.—Ida.—Ore. *Submont.*—*Mont.* Je—Jl.

10. *R. viscosissimum* Pursh. A shrub 1 m. high or less, with the young shoots and the inflorescence glandular-pubescent; leaves orbicular-reniform in

outline, pubescent and glandular on both sides, 5-8 cm. broad; lobes rounded, short and broad, crenate; racemes spreading or ascending, few-flowered; bracts oblanceolate, entire; hypanthium cylindro-campanulate, 6-7 mm. long, greenish or pinkish; sepals oblong, obtuse, about as long as the hypanthium; berry black, about 1 cm. in diameter. Mountain woods: B.C.—Mont.—Colo.—Calif. *Submont*—*Mont.* My-Jl.

11. *R. reniforme* Nutt. A robust shrub, usually 1.5-2.5 m. high, with glabrous shoots; leaf-blades reniform-orbicular, 2.5-5 cm. wide, not pubescent, glandular-pruinose on both sides; racemes 4-7-flowered, nearly as long as the leaves, glabrous; bracts light green, rhombic or obovate, nearly entire, glandular; tube of the hypanthium cream-white, about 8 mm. long, with stalked glands, but not pubescent; sepals oblong, recurved; petals white, reniform-orbicular; styles glabrous; fruit 6-8 mm. in diameter. Dry hills: Mont.—Wash.—Ore. *Submont.* Ap-Je.

12. *R. cereum* Lindl. A much branched shrub, 1 m. high or less, the young shoots finely puberulent; leaf-blades round-reniform, 1-4 cm. wide, puberulent and somewhat glandular, the lobes rounded, crenate; racemes short, puberulent, few-flowered, drooping; hypanthium-tube cylindric, pubescent, 6-8 mm. long, white, greenish, or cream-colored; sepals ovate, about 2 mm. long; petals minute, orbicular; fruit bright red, 6-7 mm. in diameter. Dry hills: Calif.—Utah—Mont.—B.C. *Son*—*Submont.* My-Jl.

13. *R. inebrians* Lindl. A low scraggling shrub, 0.5-1 m. high; leaf-blades round-reniform, 1-3 cm. wide, the lobes rounded, crenate; racemes few-flowered, pendulous, puberulent and usually glandular; tube of the hypanthium 5-8 mm. long, usually pink or pinkish; sepals ovate, acutish; fruit 6-8 mm. in diameter. *R. pumilum* Nutt. Dry hills: S.D.—w Ncb.—N.M.—Ariz.—Ida. *Plain*—*Submont* My-Jl.

4. *CHRYSOBOTRYA* Spach. FLOWERING, GOLDEN, MISSOURI, OR BUFFALO CURRANTS.

Unarmed erect shrubs. Leaves palmately veined, palmately 3-5-lobed, convolute in veneration. Inflorescence racemose, several-flowered; pedicels jointed beneath the flower. Flowers perfect, slightly irregular. Hypanthium well developed, yellow, tubular, slightly oblique. Petals erose or denticulate at the apex. Fruit a berry, disarticulating from the pedicel.

Sepals less than half as long as the hypanthium-tube.

Sepals more than half as long as the hypanthium-tube.

1. *C. odorata*.

2. *C. aurea*.

1. *C. odorata* (Wendl.) Rydb. A shrub 1-2 m. high, with pubescent young shoots and gray bark on the old stems; leaves obovate or suborbicular in outline, cuneate at the base, 2-5 cm. broad, deeply 3-5-lobed and coarsely dentate, glabrous on both sides; racemes 4-8-flowered; bracts ovate or oval, longer than the pubescent pedicels; hypanthium 10-15 mm. long; petals 2-3 mm. long, erose; berry black, globose, about 8 mm. in diameter. *Ribes odoratum* Wendl. *R. longiflorum* Nutt. *Chrysobotrya revoluta* Spach. Hillsides: S.D.—Tex. *Plain*.

2. *C. aurea* (Pursh) Rydb. Erect shrub, 1-2 m. high; leaves reniform-orbicular to obovate in outline, firm, 3-5-lobed and dentate, from cuneate to subcordate at the base, 3-5 cm. broad, glabrous or essentially so; racemes 5-15-flowered; bracts oblong or obovate, 5-12 mm. long; tube of the hypanthium 6-10 mm. long; petals oblong, erose, yellow, often tipped with red; fruit black, red, or amber-yellow, 6-8 mm. in diameter. *Ribes aureum* Pursh. *Chrysobotrya Lindleyana* and *C. intermedia* Spach. Hills and river banks: Wash.—Sask.—S D—N.M.—Calif. *Submont*.

FAMILY 60. *ROSACEAE*. ROSE FAMILY.

Herbs, shrubs or trees, usually with alternate leaves and stipules. Flowers perfect, rarely dioecious or monoecious, regular or nearly so. Hypanthium usually well developed, from flat or saucer-shaped to urn-shaped,

salverform, or tubular. Sepals normally 5, rarely 4 or 6-9, often subtended by as many bractlets. Petals as many as the sepals or rarely wanting. Stamens 1-many, most commonly 20, in three series. Gynoecium of 1-many usually wholly distinct carpels. Fruit of achenes, follicles, or drupelets.

A. Fruit consisting of 1-5 dehiscent follicles

Carpels alternate with the sepals, or less in number; stipules none or deciduous.

Carpels 1-5, if more than one more or less united below; seeds shining, pear-shaped, with a bony coat; endosperm present 1. OPULASTER

Carpels usually 5, distinct; seeds dull, linear or linear-lanceolate, with a thin coat; endosperm lacking.

Stamens inserted on the margin of the hypanthium; flowers perfect; shrubs or undershrubs with simple leaves

Filaments free, leaves entire or toothed

Carpels dehiscent on the ventral suture; shrubs with deciduous leaves 2. SPIRAEA.

Carpels dehiscent on both sutures; caespitose tufted undershrubs with persistent leaves.

Flowers racemose, rarely somewhat paniculate; stamens 20

Flowers solitary, nearly sessile at the ends of the short branches, stamens 10. 3. PETROPHYTUM

Filaments united at the base, leaves twice or thrice 3-cleft. 4. KELSEYA.

Stamens inserted on the inside of the hypanthium; flowers dioecious, tall herbs 5. LUETKEA.

with twice or thrice compound leaves 6. ARUNCUS

Carpels opposite to the sepals; stipules present, persistent, leaves pinnately dissected. 7. CHAMAEBATIARIA

B. Fruits consisting of indehiscent achenes or drupelets.
I. Carpels not enclosed in a fleshy hypanthium

a. Fruits of dry achenes

1. Ovules 2, one above the other; achenes usually 1-seeded and more or less flattened, arranged in a single circle, shrubs with simple leaves 8. SERICOTHECA.

2. Ovules and seeds solitary; achenes usually turgid and, if many, spirally arranged

a. Seeds inserted at the distal end of the ovary, i. e., opposite the origin of the style, pendulous or in genera with basal styles ascending, radicle superior.

Disk at the mouth of the hypanthium annular or obsolete; leaves and branches alternate

Style articulated to the ovary; hypanthium from campanulate to almost flat, neither contracted at the throat nor closely investing the achenes; flowers cymose or solitary.

Style not basal

Style terminal or nearly so; ovules pendulous and anatropous

Stamens separated from the receptacle by an open space, no indication of an annular thickening at the base of the filaments

Hypanthium saucer-shaped to deeply campanulate, petals oblanceolate to obcordate or cuneate, pistils usually more than 2

Filaments dilated, petaloid. 9. HORRELIA.

Filaments filiform 10. IVESIA

Hypanthium wheel-shaped; petals narrowly linear, pistils 2 11. COMANELLA.

Stamens inserted very near the base of the receptacle on a more or less evident annular thickening 12. POTENTILLA.

Style lateral; ovules ascending and amphitropous.

Achenes glabrous; herbs

Achenes numerous, stamens about 20.

Leaves odd-pinnate.

Receptacle not enlarged in fruit; petals yellow, obtuse or retuse, leaves interruptedly pinnate 13. ARGENTINA.

Receptacle somewhat enlarged in fruit, becoming spongy, petals red, acute or acuminate, leaves regularly pinnate.

14. COMARUM.

Leaves trifoliate; receptacle much enlarged and usually red in fruit, pulpy; petals white or pinkish. 15. FRAGARIA.

Achenes 10-15; stamens 5; leaves trifoliate. 16. SIBBALDIA.

Achenes hairy; shrubs; style club-shaped; leaves pinnate; petals (in ours) yellow. 17. DASIPHORA.

Carpels 2, united half their length, or only 1.

Carpels usually 2; stamens similar or nearly so.

Mature carpels more or less turgid, styles more or less spreading

Bracts obovate or spatulate, often foliaceous and more or less persistent

4. *O. bracteatus*

Bracts linear or linear-oblongate, membranous and caducous

Pedicels and the hypanthium almost glabrous, sepals stellate only on the inner surface and near the margin, shrub 1 m. high or more

5. *O. glabratus*

Pedicels, hypanthium and calyx densely stellate; shrub 0.5 m. high or less

Leaves green on both sides, almost glabrous

6. *O. monogynus*

Leaves paler and densely stellate beneath.

7. *O. Hapemanii*

Mature carpels flattened and decidedly keeled; styles erect.

8. *O. malvaceus*

Carpels usually solitary, every other filament longer and with more dilated base; leaves small, finely stellate.

9. *O. alternans*

1. *O. capitatus* (Pursh) Kuntze. Shrub, with surculose branches, sometimes even 7 m. high; branches glabrous or slightly stellate; leaf-blades broadly rounded-ovate or pentagonal in outline, distinctly 3-5-lobed, with incised or doubly serrate lobes, sparingly pubescent or glabrous above, stellate-pubescent beneath, 3-10 cm. long and usually fully as broad; sepals ovate-acute, stellate; petals orbicular, about 4 mm. long; carpels 8-10 mm. long, ovate, rather long-acuminate. *Spiraea capitata* Pursh. Woods: B.C.—Ida.—Calif. Submont. My-Jl.

2. *O. cordatus* Rydb. Tall shrub; branches brown, glabrous and shining; leaf-blades rounded-cordate to somewhat reniform in outline, 4-10 cm. long and about as broad, 3-5-lobed, with rounded or acute lobes, serrate, with rounded-ovate teeth, glabrous on both sides or with scattered hairs beneath; inflorescence dense; sepals ovate, acute, densely stellate, 3-4 mm. long; carpels 8-9 mm. long, abruptly acute. Open woods: w Ida.—n Calif. Submont. Je-Jl.

3. *O. intermedius* Rydb. Shrub 1-1.5 m. high; branches glabrous or nearly so; blades ovate to orbicular in outline, usually shallowly 3-lobed, 2-6 cm. long, doubly crenate, glabrous or nearly so above, usually sparingly hairy beneath; inflorescence dense; bracts linear-oblongate, caducous; sepals ovate, acute, densely stellate on both sides; petals 4 mm. long; carpels united at the base, rounded-ellipsoid, abruptly acuminate, 7-8 mm. long. *O. Ramaleyi* A. Nels., mainly. *P. intermedius* C. K. Schneider. Creek banks and hillsides: w N.Y.—Mo.—Colo.—S.D. Plain—Submont. Je-Jl.

4. *O. bracteatus* Rydb. Shrub 1-2 m. high; branches yellowish green, glabrous; leaf-blades 2-7 cm. long, broadly ovate or subcordate in outline, more or less deeply 3-lobed, doubly crenate, glabrous or nearly so, somewhat paler beneath; corymb many-flowered; sepals ovate, acute, densely stellate on both sides, about 3 mm. long; petals 4-5 mm. long; carpels densely stellate, united at least half their length. *O. Ramaleyi* A. Nels., in part. *P. Ramaleyi* A. Nels. Mountains: Colo. Submont. Je-Jl.

5. *O. glabratus* Rydb. Shrub about 1 m. high; leaf-blades rounded-ovate, orbicular or sometimes slightly reniform, 2-3 cm. long, glabrous, slightly paler beneath, 3-5-lobed, doubly crenate; sepals oval or rounded-ovate, obtuse, about 3 mm. long; petals about 4 mm. long, pink or white; follicles 2, densely stellate. Mountains: Colo. Submont.—Mont. Je-Jl.

6. *O. monogynus* (Torr.) Kuntze. Shrub usually less than 1 m. high, with usually decumbent stems; blades 1-3 cm., rounded-ovate to reniform in outline, usually rather deeply 3-5-lobed, incised; sepals lance-ovate to elliptic, usually obtuse; petals about 3 mm. long; follicles densely stellate, 3-4 mm. long, with ascending-spreading beaks. *P. Torreyi* Maxim. *P. monogynus* Coulter. Mountains: (Black Hills) S.D.—Wyo.—N.M.—Nev. Submont.—Mont. My-Jl.

7. *O. Hapemanii* Rydb. Low shrub, 1 m. or less high; blades rounded-ovate to reniform in outline, 1-2 cm. broad, rather deeply 3-lobed, incised, obtuse or rounded at the apex, stellate on both sides, paler beneath; sepals broadly ovate, obtuse, about 3 mm. long; petals about 3 mm. long; follicles 2, densely stellate; beaks ascending-spreading. Mountains: Wyo.—Utah. Mont. Je-Jl.

8. *O. malvaceus* (Greene) Kuntze. Shrub 1-2 m. high; leaf-blades orbicular or rounded-ovate in outline, more or less distinctly 3-5-lobed, doubly crenate,

glabrous or stellate on both sides, thin, 2-6 cm. long and about as broad; bracts spatulate or cuncate, caducous; sepals ovate, 4-5 mm. long; petals often 5 mm. long; follicles 2, united nearly two-thirds their length, about 5 mm. long, dehiscent after falling. *O. pubescens* Rydb. *P. malvaceus* Kuntze. *P. pubescens* Coult. & Nels. Mountains, hillsides, and rocky banks: B.C.—Ore.—Utah—Wyo.—Mont. *Submont.*—Mont. My-Jl.

9. *O. alternans* (M. E. Jones) Heller. Low shrub, with divaricate, gray, finely stellate branches; blades orbicular or reniform, about 1 cm. long, more or less deeply 3-lobed, doubly crenate, rounded or obtuse at the apex, stellate-pubescent on both sides, densely so beneath; bracts oblanceolate, usually lacinate, caducous; sepals densely stellate on both sides, ovate, obtuse; petals about 3 mm. long. *Nellia alternans* M. E. Jones. Mountains: Utah—Nev. *Submont.*—Mont. Je-Jl.

2. SPIRÆA L. MEADOW SWEET.

Shrubs, with simple, feather-veined leaves, which are usually serrate, and no stipules. Inflorescence racemose, corymbose or paniculate. Flowers in ours perfect. Hypanthium hemispherical, campanulate, or turbinate. Sepals 5, valvate or slightly imbricate. Petals 5, imbricate, white to red. Stamens 15-70, inserted in 1-several series under the margin of a more or less developed disk. Pistils 5, rarely 3-8, distinct, inserted in the bottom of the hypanthium; styles terminal; stigmas capitate or discoid; ovules 2-several, anatropous, pendulous. Follicles leathery, not inflated, opening along the ventral suture; seeds several, in ours usually 4, pendulous, linear-lanceolate or oblong, tapering at both ends, endosperm none or almost none.

Panicle flat-topped, sepals erect or merely spreading.

Petals pink or rose-colored, corymb small

1. *S. densiflora*.

Petals white, seldom tinged with rose, corymb larger.

2. *S. lucida*.

Panicle elongate, conical or ovoid, or lanceolate.

Sepals merely spreading, disk obsolete

Inflorescence glabrous, leaf-blades broadly oblanceolate to obovate.

3. *S. latifolia*.

Inflorescence pubescent, leaf-blades narrowly oblanceolate.

4. *S. alba*.

Sepals soon reflexed, disk usually rather conspicuous.

Leaves not tomentose beneath.

Stem glabrous, leaves serrate to near the base.

5. *S. idahoensis*.

Stem more or less pubescent, leaves toothed above the middle.

6. *S. Menziesii*.

Leaves tomentose beneath.

7. *S. Douglasii*.

1. *S. densiflora* Nutt. Low shrub, 2-6 dm. high, with ascending branches; bark of the twigs dark reddish brown, glabrous; leaf-blades oval or elliptic, rounded at both ends, glabrous or essentially so, bright green above, somewhat paler beneath, crenate or serrate above the middle, 1.5-3 cm. long; sepals ovate, obtuse; petals nearly 1.5 mm. long, obovate; follicles glabrous and shining. Mountains: B.C.—Ore.—Wyo.—Mont. *Submont.*—Mont. Jl-Au.

2. *S. lucida* Dougl. Low shrub, with creeping rootstock; stems and branches erect, often dying down annually to near the base, 3-10 dm. high; blades of the lower leaves obovate, of the upper oval, often acutish, 2-6 cm. long, thin, glabrous, shining above, paler beneath, coarsely serrate or incised; sepals triangular, acute; petals white, orbicular, about 2 mm. long; follicles glabrous, shining. Mountains: B.C.—Ore.—Wyo.—Sask. *Submont.*—Mont. My-Jl.

3. *S. latifolia* (Ait.) Borkh. A shrub, 1-20 dm. high, branched; bark of the twigs glabrous, chestnut, leaf-blades broadly oblanceolate or obovate, thin, 2-8 cm. long, acute, obtuse or rounded at the apex, sharply and sometimes doubly serrate; inflorescence 0.5-2 dm. long and about half as wide; bracts sometimes rhizate; sepals triangular, acute; petals white or a little pinkish in bud; follicles glabrous and shining. Meadows: Newf.—N.C.—w Pa.—Sask. *Boreal.* Je-S.

4. *S. alba* DuRoi. A shrub, 1-2 m. high; bark of the twigs brown; leaf-blades rather firm, more or less puberulent on the veins, sharply serrate, acute at both ends, 3-6 cm. long; inflorescence 5-20 cm. long; sepals triangular, acute; petals white, about 2 mm. long; follicles glabrous, shining. *S. simplex* Greene. Swamps and wet ground: Newf.—N.C.—la.—N.D.—Sask. *Boreal.* Je-Au.

5. *S. idahoensis* A. Nels. A shrub, 1-2 m. high, branched below; leaves ovate or oval, rarely elliptic, serrate except the very base, 5-9 cm. long; inflorescence paniculate, cylindric or pyramidal, dense, only slightly pubescent on the branches; sepals reflexed, triangular-ovate; petals rose-colored, about 2 mm. long, ovate; follicles obovate-oblong. Mountains and foot-hills: Ida. *Submont.* Au.

6. *S. Menziesii* Hook. A shrub, 1-1.5 m. high; bark of the twigs brown and usually puberulent; leaf-blades elliptic, oblong, or oval, serrate above the middle, acute, obtuse or rounded at either end, glabrous or puberulent on the veins, 3-10 cm. long; inflorescence very dense, long and narrow, spike-like; sepals pubescent, ovate; petals rose-colored, 1.5 mm. long; follicles glabrous. Along streams: s Alaska—B.C.—Ore.—Ida. *Submont.* Je—Au.

7. *S. densiflora* × *Menziesii*. Resembling most *S. densiflora*, but the inflorescence more conic and the sepals reflexed; inflorescence shorter and more open and leaves finer serrate than in *S. Menziesii*. *S. roseata* Rydb. Ida

8. *S. lucida* × *Menziesii*. Intermediate between the two parents, having the leaf-form of the former, the size of the plant and reflexed sepals of the latter, inflorescence intermediate, pyramidal and open and the petals white or pale pink. *S. pyramidata* Greene. B.C.—Ida.—Ore.

9. *S. Douglasii* Hook. A shrub, 1-2.5 m. high; bark of twigs brown and more or less tomentose; leaf-blades elliptic, oblong, oval, or oblong-cuneate, 3-10 cm. long, serrate above the middle, dark green above, white-tomentose beneath; inflorescence very long and narrow; sepals tomentose outside, ovate; petals rose-colored, about 1.5 mm. long; follicles glabrous and shining. Lowlands: B.C.—Calif. *Submont.* Je—Au.

3. *PETRÓPHYTUM* (Nutt.) Rydb.

Densely caespitose and depressed undershrubs, with prostrate branches, growing on rocks. Leaves oblanceolate or spatulate, entire, coriaceous, evergreen, crowded on the short branches. Inflorescence racemose, rarely compound. Flowers perfect. Hypanthium hemispheric. Sepals 5, valvate. Petals 5, imbricate, white. Stamens about 20; filaments filiform, distinct, about twice as long as the sepals. Disk evident, entire, margined. Pistils 3-5; ovary and lower part of the style very hairy; style filiform, terminal; ovules 2-4, pendulous. Follicles leathery, dehiscent along both sutures; seeds linear.

Leaves spatulate, spreading, racemes short, 1-4 cm. long; bracts usually shorter than the flowers 1. *P. caespitosum*

Leaves narrowly oblanceolate, erect or ascending; inflorescence 4-10 cm. long, often branched, bracts usually exceeding the flowers 2. *P. elatius*

1. *P. caespitosum* (Nutt.) Rydb. Season's shoots very short; leaves spatulate, 5-12 mm. long, 2-4 mm. wide, densely silky, 1-ribbed, obtuse or mucronate; sepals ovate-lanceolate, acute, 1.5 mm. long; petals spatulate, obtuse, 1.5 mm. long; follicles 3-5, 2 mm. long. *Spiraea caespitosa* Nutt. Rocks: (Black Hills) S.D.—N.M.—Ariz.—Calif.—Ida.—Mont. *Plain—Mont.* Jl—S.

2. *P. elatius* (S. Wats.) Heller. Shoots of the season often 2-3 cm. long, erect; leaves silky, oblanceolate, acute, 1.5-2 cm. long, 3-4 mm. wide, usually with more distinct petioles; sepals lanceolate, 2 mm. long, acute or acuminate; petals oblanceolate, 2-3 mm. long. *Spiraea caespitosa elatior* S. Wats. Mountains: Utah—Ariz. *Son.—Mont.* Jl—S.

4. *KELSEYA* (S. Wats.) Rydb.

Densely caespitose, pulvinate undershrubs, with short branches. Leaves entire, crowded, leathery, persistent. Flowers perfect, solitary, almost sessile, enclosed in the rosettes of the leaves. Hypanthium hemispheric. Sepals 5, valvate. Petals 5, imbricate. Stamens about 10; filaments filiform, about twice as long as the sepals; anthers didymous. Disk inconspicuous, entire. Pistils about 5; styles terminal; stigmas minute; ovules 3-4, pendulous. Follicles leathery, not inflated, opening along both sutures; seeds elongate-fusiform.

1. *K. uniflora* (S. Wats.) Rydb. Leaves crowded, 2-3 mm. long, more or less silky-pubescent; sepals oblong, obtuse, 1.5 mm. long; petals narrowly spatu-

late, nearly 3 mm. long, white; folioles 2-2.5 mm. long. Cliffs in the mountains: Mont.—n Wyo.—Ida. *Submont.*—*Mont.* Jl.

5. *LUETKEA* Bong.

Cespitose undershrubs, with decumbent or creeping, stoloniferous branches. Leaves twice or thrice ternately dissected, grooved above. Flowers perfect, racemose. Hypanthium hemispheric. Sepals 5, valvate. Petals 5, while in bud contorted. Stamens about 20; filaments subulate, connate at the base; anthers didymous. Disk thickened, about 10-lobed. Pistils 4-6, usually 5, distinct; styles terminal, deciduous; stigmas truncate; ovules several, pendulous. Folioles coriaceous, dehiscent on both sutures. Seeds linear-lanceolate, acute at both ends.

1. *L. pectinata* (Pursh) Kuntze. Flowering shoots 5-15 cm. high, leafy, glabrous; leaves 1-1.5 cm. long, dissected into linear, acute divisions, glabrate; raceme short, 1-5 cm. long; bracts ternate or the upper ones entire; hypanthium about 2 mm. wide; sepals ovate, acute, 2 mm. long, glabrous; petals white, orbicular or rounded-obovate, 3-3.5 mm. long; carpels about 4 mm. long. *Eriogynia pectinata* Hook. *Spiraea pectinata* T. & G. Mountains: Alaska—Ore.—Alta. *Mont.* Jl-S.

6. *ARÚNCUS* (L.) Adans. GOAT'S BEARD.

Perennial herbs, with thick rhizomes, twice or thrice ternate-pinnatisect leaves, and no stipules. Inflorescence a large panicle with spike-like branches. Flowers dioecious. Hypanthium of the staminate flowers flat or saucer-shaped, pentagonal. Sepals triangular, valvate. Petals 5, orbicular to spatulate, white. Stamens 15-30; filaments subulate, distinct, long-exserted; anthers didymous. Disk 5-lobed. Pistils 3-5, rudimentary, style-less. Pistillate flowers much smaller. Petals elliptic to oblanceolate. Stamens rudimentary; filaments short; anthers minute, empty. Pistils 3-5, distinct; styles short, obliquely terminal; stigmas capitate; ovules 8-12, pendulous. Folioles oblong, cartilaginous, dehiscent along the ventral suture and then splitting dorsally at the apex, in our species reflexed. Seeds few, attenuate at both ends.

1. *A. acuminatus* (Dougl.) Rydb. Stem 1-2 m. high, glabrous; leaflets 3-12 cm. long, lanceolate, long-acuminate at the apex, truncate or subcordate at the base, sharply and doubly serrate; panicles terminal and axillary, 1-4 dm. long; petals of the staminate flowers broadly rounded-obovate, about 1 mm. long, those of the pistillate flowers slightly smaller, elliptic; folioles about 3 mm. long and 1 mm. thick, shining. *A. sylvester* Coult. & Nels., not Kost. Moist woods and along streams: Ore.—Alaska—B.C. *Mont.* Je-S.

7. *CHAMAEBATIÀRIA* (Porter) Maxim. FERN-BUSH.

Low shrubs, more or less stellate-pubescent and scurfy, with bipinnatisect leaves and paniculate flowers. Hypanthium turbinate. Sepals 5, erect, imbricate. Petals 5, rounded, erect. Stamens about 60, inserted on the margin of the disk. Pistils 5, more or less united below; styles terminal; stigmas capitate; ovules about 8, pendulous. Folioles coriaceous, dehiscent on the ventral suture and at the apex on the dorsal one; seeds few, terete, not appendaged.

1. *C. Millefolium* (Torr.) Maxim. A densely branched shrub, less than 1 m. high; leaves 2-4 cm. long, crowded at the ends of the branches, glabrous above, stellate-tomentose beneath, oblong in outline; primary divisions about 20 pairs, 4-8 mm. long; secondary divisions 15-17 pairs, decurrent, about 0.5 mm. long, entire, obovate; panicle 3-10 cm. long, leafy below; sepals lanceolate-deltoid, acute, 3 mm. long; petals white, rounded-obovate, about 5 mm. long, wavy and erenulate; folioles about 5 mm. long. *Spiraea Millefolium* Torr. Among rocks: Ida.—Nev.—Ariz.—s Calif. *Submont.*—*Mont.* Jl-S.

8. *SERICOTHÈCA* Raf. OCEAN SPRAY, MOUNTAIN SPRAY.

Shrubs, with simple toothed or lobed leaves. Sepals 5, 3-nerved, valvate in the bud, in fruit erect. Petals 5, white or pinkish, short-clawed. Stamens

about 20. Achenes inclosed in the calyx, short-stipitate, long-hairy, membranaceous, indehiscent, caducous, strongly arched on the lower suture; seeds broadly oblong, with a double coat. [*Holodiscus* Maxim.]

Leaves grayish- or whitish-tomentose and villous beneath

Inflorescence ample, well-compound, leaves usually over 3 cm long

Leaf-blades abruptly contracted below, scarcely decurrent on the petioles, 4-10 cm long. 1 *S. discolor*

Leaf-blades cuneate at the base and distinctly decurrent on the winged petioles, 2-5 cm long. 2 *S. dumosa*

Inflorescence small and narrow, simple, racemose, or with a few short, spreading branches; leaves usually less than 2 cm. long, finely pubescent and green above, white silky-villous and tomentose beneath 3 *S. microphylla*

Leaves glandular-atomiferous and slightly hairy on the veins beneath, not at all tomentose, 1-1.5 cm long, glabrous or sparingly pubescent. 4. *S. glabrescens*.

1. *S. discolor* (Pursh) Rydb. Shrub 1-4.5 m. high; leaf-blades rounded-ovate or oval, usually double-toothed, with broadly ovate, mucronate teeth, acute at the apex, truncate, rounded, or cuneate at the base, 4-10 cm. long, thin, green and sparingly pubescent, or in age glabrate above, more or less densely villous and tomentose beneath; inflorescence conical or ovate, 10-20 cm. long twice or thrice compound; sepals oblong; petals white, elliptic, 1.5 mm. long or more; stamens 15-20; pistils usually 5; carpels semi-ovate, 1-5 mm. long. *Holodiscus discolor* (Pursh) Maxim. *H. araeifolius* (Smith) Howell. Hills and river banks. B.C.—Cal.—Ida.—w Mont. Submont. Je—Au.

2. *S. dumosa* (Nutt.) Rydb. Shrub 6-10 dm. high; leaf-blades obovate, 2-5 cm. long, obtuse or acute at the apex, often double-toothed above, green and short-hairy above, white and densely villous and tomentose beneath; inflorescence usually twice compound, ovoid, 5-20 cm. long; sepals ovate or lance-ovate; petals elliptic or oval, about 2 mm. long; stamens about 20; pistils 5; carpels about 1.5 mm. long. *H. discolor* (Nutt.) Heller. *H. australis* Heller. Mountains: Wyo.—Utah—N.M.—Chihuahua. Submont.—Mont. Je—S.

3. *S. microphylla* Rydb. A low diffuse shrub, 3-10 dm. high; leaf-blades spatulate-cuneate, 1-1.5 cm., rarely 2 cm. long, evenly serrate above the middle, obtuse at the apex, cuneate at the base; inflorescence small, 3-5 cm. long; sepals about 1 mm. long, ovate, villous; petals broadly obovate or oval, a little exceeding the sepals; stamens 20; carpels about 1.5 mm. long. *H. microphyllus* Rydb. Mountains: Colo.—Wyo.—Utah; apparently also in Calif. Submont.—Mont. Je—Au.

4. *S. glabrescens* (Greenm.) Rydb. A diffuse shrub, 6-12 dm. high; leaf-blades cuneate-obovate, 1-1.5 cm. long, decurrent on the short petioles, evenly toothed above the middle; inflorescence more or less compound, 3-6 cm. long; the branches short and spreading; sepals ovate, 1.5 mm. long; petals white, oval, 2 mm. long; stamens 20; carpels 1.5 mm. long. *Spraea discolor glabrescens* Greenm. *H. glabrescens* Heller. Mountains: Ore.—n Calif.—Utah. Submont.—Mont. Je—Au.

9. *HORKELIA* Cham. & Schlecht.

Perennial herbs, with scaly rootstocks or caudices. Leaves pinnately compound, usually with many leaflets. Inflorescence cymose-paniculate. Hypanthium deeply campanulate to saucer-shaped. Bractlets, sepals, and petals 5. Petals strap-shaped, oblanceolate, obovate, cuneate, or orbiculate, often unguiculate, white or light yellow. Stamens 10, inserted in the throat of the hypanthium; filaments dilated and more or less petaloid, persistent, triangular, subulate, with a distinct midrib. Receptacle generally conic or hemispheric, with numerous pistils. Style long and slender, articulated to the achene and deciduous. Ovule and seed inserted near the base of the style, pendulous and anatropous.

Plant less than 3 dm high; petals 2-3 mm long.

1. *H. parviflora*

Plant more than 3 dm high; petals 3-6 mm long.

Leaflets ovate or oval, 2-3 cm. long; bracts generally exceeding the inflorescence

2. *H. capitata*

Leaflets obovate or cuneate, usually less than 2 cm. long; bracts shorter than the inflorescence.

3. *H. fusca*.

1. **H. parviflora** Nutt. Perennial, with a short woody caudex; stem erect, densely glandular, 1-2 dm. high; leaflets 5-8 pairs, densely pilose and glandular, obovate or nearly orbicular, coarsely crenate; cyme subcapitate; hypanthium cup-shaped, 2-3 mm. broad, tinged with purple; sepals lanceolate, 2-3 mm. long; bractlets linear, much shorter; petals broadly cuneate, emarginate. Sagebrush lands and mountain sides: Calif.—Nev.—Ida.—Ore. *Submont.* Jl—Au.

2. **H. capitata** Lindl. Perennial; stem erect, rather simple, 4-6 dm. high, nearly glabrous below, glandular-hirsute above; basal leaves 2-3 dm. long, pinnate, nearly glabrous; leaflets 5-7 pairs, obovate or oval, 2-3 cm. long, deeply incised-toothed; stem-leaves similar, but the upper with narrower oblanceolate acute leaflets; hypanthium glandular-hirsute, deeply cup-shaped; bractlets linear, nearly equalling the triangular-lanceolate acuminate sepals; petals broadly cuneate, 5-6 mm. long, truncate at the apex. Mountains: Ore.—Ida. *Submont.* Je—Jl.

3. **H. fusca** Lindl. Perennial, with a short woody caudex; stems several, 2-6 dm. high, more or less glandular, often more or less tinged with brown or purple; basal leaves 1-2 cm. long, somewhat glandular-pubescent or glabrate; leaflets 5-7 pairs, obovate or cuneate, toothed or incised toward the apex, 1-2 cm. long; hypanthium glandular-villous, cupulate; bractlets linear, much shorter than the ovate-lanceolate sepals; petals broadly cuneate, 3-4 mm. long, truncate at the apex. Ore.—Calif.—Nev.—Ida. *Son.—Submont.* Je—Au.

10. IVESIA T. & G.

Perennials, with thick erect rootstocks and short, often woody caudices. Leaves mostly basal and numerous, pinnately divided usually into numerous small more or less crowded and imbricate leaflets. Inflorescence cymose. Hypanthium from deeply campanulate or turbinate to saucer-shaped. Bractlets, sepals, and petals 5. Petals usually oblanceolate and more or less clawed, but sometimes nearly orbicular and practically clawless, white or yellow. Stamens 5-20, inserted in the throat of the hypanthium; filaments filiform. Receptacle from hemispheric to flat, usually poorly developed and bearing 3-15 pistils surrounded by a ring of prominent bristles. Styles long and slender, terminal or nearly so. Ovules and seeds pendulous and anatropous.

Leaflets numerous, more or less crowded, usually divided to near the base

Stem leafy, stamens 20. claws of the white petals obsolete

Stem few-leaved or scapiform, stamens 5, petals yellow or yellowish, clawed.

Cyme corymbiform; hypanthium cup-shaped.

Bractlets linear, stem decumbent.

Bractlets oblong or lanceolate, stem erect

Cyme subcapitate, hypanthium campanulate.

Leaflets comparatively few, obovate, merely incised.

1. *I. Kingii*.

2 *I. utahensis*.

3 *I. mutabilis*.

4 *I. Gordonii*.

5. *I. beneolens*.

1. **I. Kingii** S. Wats. Perennial, with a thick, deep and woody root, crowned with a very short erect caudex; stems several, leafy, glabrous, prostrate, 2-4 dm. long; basal leaves numerous, glabrous, pinnate, with 20-25 pairs of crowded leaflets, glabrous; leaflets 3-5 mm. long, divided to the base into 2-4 ovate or oblong segments; cyme narrow; hypanthium saucer-shaped, in fruit 3-4 mm. in diameter; petals white, obovate or broadly spatulate, much exceeding the sepals; stamens 20. Desert regions: Nev.—w Utah *Son.* Je—Au.

2. **I. utahensis** S. Wats. Perennial, with a woody but not very thick root, crowned by a caespitose caudex; stems several, about 1 dm. high, glabrous below, glandular above; basal leaves glabrous, pinnate, with 15-20 pairs of crowded leaflets, these 2-4 mm. long, cleft to the base into 3 to 5, broadly oblong to spatulate segments; stem-leaves few and very small; hypanthium somewhat glandular-puberulent, cup-shaped, veiny, 3 mm. in diameter; petals yellowish, spatulate, scarcely exceeding the sepals; stamens 5. Mountains: Utah. *Mont.—Subalp.* Au.

3. **I. mutabilis** (Brand.) Rydb. Perennial, with a very thick woody root and short caudex; stems several, 3 dm. high, somewhat villous or nearly glabrous; basal leaves numerous, pinnate, with numerous leaflets, villous and somewhat glandular; leaflets sessile, more or less imbricate, 2-5 mm. long, usually

divided to near the base into obovate-oblong divisions; cyme much branched, open; hypanthium 4 mm. broad, glandular-puberulent and sparingly hirsute; petals yellow, shorter than the sepals, oblanceolate; stamens 5; pistils 2-7. Mountains: Nev.—Utah. *Son.*—*Submont.*

4. *I. Gordonii* (Hook.) T. & G. Perennial, with a thick and deep root and short woody caespitose caudex; stem subscapose, minutely glandular-puberulent or glabrous, 1-2 dm. high, seldom 3 dm.; basal leaves numerous, finely puberulent or glabrate, pinnate; leaflets 10-20 rather approximate pairs, 5-12 mm. long, divided into 3-5 segments or again divided; segments broadly oblong to linear; hypanthium campanulate, 3-4 mm. in diameter, villous-puberulent and somewhat glandular, yellowish; petals yellow, spatulate or oblanceolate, shorter than the sepals. Mountains: Wash.—Calif.—Colo.—Mont. *Submont.*—*Subalp.* Je—Au.

5. *I. beneolens* (A. Nels.) Rydb. Perennial, with thick woody caudex, densely covered with remains of old leaves; stems several, 7-15 cm. long, viscid-puberulent; basal leaves numerous, about 1 dm. long, with 5-9, obovate, flabelliform or suborbicular leaflets; these 5-15 mm. long, parted and incised into oblong lobes, viscid-puberulent; stem-leaves with 3-5 smaller leaflets; flowers cymose; hypanthium saucer-shaped, 5-angled, with a disk; sepals ovate; petals white, linear-oblanceolate; stamens 5; pistils 3-5. *Hookera beneolens* A. Nels. Crevices of basalt cliffs: Ida. *Son.* Je.

11. *COMARÉLLA* Rydb.

Perennial herbs, with very thick woody taproots and short thick scaly caudices. Leaves pinnate with numerous crowded leaflets. Inflorescence cymose-paniculate, with slender branches. Hypanthium wheel-shaped, *i. e.*, the central portion turbinate, enclosing the ovaries, and beset on its inner surface with long bristles, the lateral portion flat, pentagonal in outline. Petals dark purple, narrowly linear, shorter than the calyx. Stamens 5, inserted at the outer margin of the flat portion of the hypanthium; filaments filiform, bent inward; anthers small. Pistils two; styles long and filiform, terminal.

1. *C. sabulosa* (M. E. Jones) Rydb. Stem several from the caudex, ascending, less than 2 dm. high, slender, glabrous; leaves glabrate, pinnate; leaflets about 15 rather approximate pairs, 3-5 mm. long, 2-3-cleft into oval segments; hypanthium glabrous, 3-4 mm. in diameter, in age 5-angled; bractlets linear-subulate, thickish, much smaller than the ovate-lanceolate acuminate sepals. *Potentilla sabulosa* M. E. Jones. Mountains: Utah. *Son.* Au—S.

12. *POTENTÍLLA* L. CINQUEFOIL, FIVE-FINGER.

Annuals, or perennial herbs, with rootstocks. Leaves pinnately or digitately compound. Inflorescence usually cymose-paniculate. Hypanthium concave, mostly hemispheric. Bractlets, sepals, and petals 5 (sometimes 4). Petals deciduous, obcordate, obovate, rotund, or cuneate, as a rule not unguiculate, yellow, white, or dark-purple. Stamens most commonly 20, in three series, *viz.*, 10, 5, and 5, respectively, sometimes more, sometimes fewer; filaments filiform or subulate, neither flattened nor dilated. Receptacle hemispheric or conic, bearing usually numerous pistils. Style usually long and filiform, attached near the apex of the ovary, deciduous. Seeds inserted near the base of the style, pendulous and anatropous.

Cymes very leafy, many-flowered; annuals or biennials, rarely short-lived perennials; styles fusiform and glandular at the base. I. SUPINAE
Cymes not very leafy, generally rather few-flowered; perennials with rootstocks.

Leaves digitate.

Basal leaves 5-9-foliolate

Basal leaves without an additional pair of leaflets on the petioles.

Plants more than 2 dm. high.

Leaves green on both sides, sparingly hairy, not at all tomentose.

II. NUTTALLIANAE

Leaves either densely hairy or more or less tomentose beneath.

Leaflets merely crenate or cut-toothed, the toothing not extending half-way to the midrib

Leaflets densely pubescent beneath, if at all tomentose, the tomentum hidden under the long hairs, green and sparingly pubescent on the upper side.

Leaflets principally tomentose beneath, only slightly hairy.

Leaflets cleft more than half-way to the midrib into linear, oblong, or lance-oblong divisions.

Stems ascending or decumbent at the base; stem-leaves few, reduced, with 3-5 leaflets.

Stems leafy; most of the stem-leaves 7-foliate.

Plants less than 2 dm high

Leaves neither tomentose nor silky, green.

Leaves tomentose or silky, at least beneath.

Basal leaves digitately 5-foliate, with an additional pair of smaller leaflets on the petiole

Basal leaves 3-foliate.

Leaves more or less tomentose beneath.

Leaves not tomentose

Leaves odd-pinnate.

Style much longer than the mature achene, filiform.

Leaves with 1-3 more or less approximate pairs of leaflets; plants low.

Leaves not at all tomentose.

Style subterminal

Style attached below the apex of the achene.

Leaves more or less tomentose beneath

Leaves with 3-13 pairs of leaflets, plants usually comparatively tall.

Leaves grayish or whitish, silky or tomentose, at least beneath.

Leaves green on both sides or merely strigose.

Style not longer than the mature achene, thickened and glandular below; leaves usually more or less tomentose beneath.

I. SUPINAE

Achenes with a corky gibbosity on the upper suture; leaves all pinnate with 3-5 pairs of leaflets

1. *P. paradoxa*.

Achenes not gibbous.

Lower leaves pinnate with 2 approximate pairs of leaflets, the upper ternate; stem strict, inflorescence cymose

2. *P. rivalis*.

Leaves all digitate, the basal ones rarely pinnate in *P. monspeliensis*

Leaves ternate

Petals about half as long as the sepals; achenes whitish, smooth; hypanthium in fruit 5 mm. wide or less

Stem slender, petals cuneate or obovate; sepals and bractlets 3-4 mm long.

Stem with diffuse, spreading branches, leaflets cuneate, inflorescence cymose

3. *P. millegrana*.

Stem with erect or strongly ascending branches; inflorescence inclined to be falsely racemose; leaflets broadly obovate; plant decidedly glandular-puberulent

4. *P. biennis*

Stem stout, petals obcordate; sepals and bractlets 5 mm long; plants densely glandular

5. *P. Kelseyi*.

Petals equalling the sepals or nearly so; hypanthium in fruit about 7 mm wide, stamens 15-20

6. *P. monspeliensis*

Lower leaves digitately 5-foliate, or ternate with the lateral leaflets 2-cleft to near the base; stamens 5.

7. *P. pentandra*.

II. NUTTALLIANAE.

Calyx and leaves more or less glandular-atomiferous; whole plant yellowish or brownish green; leaves with strong ribs

Leaflets dissected into linear or oblong divisions.

8. *P. brunnescens*.

Leaflets coarsely toothed with lanceolate teeth

9. *P. Nuttallii*.

Calyx and leaves not glandular-atomiferous, plant neither yellowish nor brownish; ribs of the leaves not prominent.

Pubescence of the stem and petioles appressed.

Leaflets coarsely toothed.

Leaflets obovate or oblanceolate, toothed to near the base.

10. *P. jucunda*.

Leaflets cuneate-obovate, the middle ones mostly toothed above the middle, entire at the base.

11. *P. glaucophylla*.

Leaflets dissected at least half-way to the midrib.

Leaves rather densely silky beneath.

12. *P. rectiformis*.

Leaves glabrous except the veins

13. *P. glabrata*.

Pubescence of the stem and petioles spreading; leaflets loosely hairy, often slightly tomentose beneath.

14. *P. dasica*.

III. CANDIDAE.

Segments of the leaflets lanceolate, acute; tomentum sparse.

22. *P. viridescens*.

Segments of the leaflets oblong to linear, obtusish, tomentum dense.

Pubescence of the petioles and stems appressed.

Stem and mature leaves more or less hairy; leaflets obovate, at least the upper pinnatisect.

Divisions of the leaflets long, narrowly linear; stem 2-3 dm. high, leaflets many. 66 *P. wyomingensis*.

Divisions of the leaflets oblong or oblanceolate; stem less than 2 dm. high; leaflets few. 67. *P. ovina*.

Leaflets not dissected to near the midrib.

Leaves not densely grayish-strigose.

Sepals ovate or lance-ovate, bractlets lanceolate or oblong.

Stem about 1 dm. high; leaflets 1 cm. long or less, toothed only at the apex. 65. *P. decurrens*.

Stem 2-4 dm. high, leaflets more than 2 cm. long. 68. *P. Drummondii*.

Sepals linear-lanceolate, acuminate; bractlets linear-subulate.

54 *P. rupicola*.

Leaves densely grayish-strigose or silky.

Stem 1-4 dm. high, ascending or decumbent; leaflets cuneate or linear-oblong, conduplicate, toothed at the apex only. 69. *P. crinita*.

Stem stout, 6-7 dm. high; leaflets obovate-oblong, coarsely serrate.

62. *P. ambigua*.

XV. MULTIFIDAE.

Pubescence of the under side of the leaves silvery-white.

Petioles and lower part of the stem silky villous with spreading hairs.

70. *P. pauciflora*.

Petioles and stem tomentulose and silky strigose.

Segments of the leaflets linear or linear-oblong; branches of the inflorescence usually short and ascending.

Leaflets usually white on both sides, petals and sepals 4-6 mm. long.

Stem decumbent or ascending, 0.5-1 dm. high, leaflets 2 or 3 rather approximate pairs. 71. *P. pseudosericea*.

Stem erect, 3-5 dm. high; leaflets 3-7 usually rather remote pairs.

72. *P. bipinnatifida*.

Leaflets green above; petals and sepals about 3 mm. long.

73. *P. virgulata*.

Segments of the leaflets lanceolate or oblong, usually green above, branches of the inflorescence long and erect.

74. *P. platyloba*.

Pubescence of the under side of the leaves grayish.

Petioles and stem appressed-pubescent.

Segments of the leaflets narrowly linear; petals and sepals about 3 mm. long.

73. *P. virgulata*.

Segments of the leaflets ovate, lanceolate, or oblong; petals and sepals 4-6 mm. long.

Leaves glandular-pruinose above and sometimes with scattered long hairs.

75. *P. glabella*.

Leaves short-strigose above.

Margins of the leaf-segments not revolute.

76. *P. pennsylvanica*.

Margins of the leaf-segments revolute.

77. *P. arachnoidea*.

Petioles and stem with spreading hairs.

Flowers distinctly pedicelled; upper leaflets of the basal leaves with 9-13 segments, pubescence of the stem and petioles long.

Plant dark green; leaves scarcely paler beneath.

78. *P. atrocirens*.

Plant not dark green, leaves decidedly paler beneath.

79. *P. strigosa*.

Flowers usually subsessile, densely conglomerate, upper leaflets of the basal leaves with 15-21 segments, pubescence of the stem short and dense.

80. *P. lasiodonta*.

1. *P. paradoxa* Nutt. Stem spreading or ascending, seldom erect, about 2-5 dm. high, leafy; leaves in age nearly glabrous, light green in color; leaflets obovate-cuneate, deeply crenate or cleft, 1-2 cm. long; flowers about 7 mm. in diameter; bractlets and sepals oblong-ovate, acute or mucronate, about equal in length; petals yellow, obovate-cuneate, truncate or slightly emarginate; stamens 15-20. Low ground: N.Y.—Ont.—N.M.—Utah—Wash.; Mex., e Asia. *Plain*—*Submont.* Je—Au.

2. *P. rivalis* Nutt. Stem erect and simple, finely villous-hirsute, leafy; leaflets 2-5 cm. long, obovate, with coarse ovate teeth; flowers less than 5 mm. in diameter; bractlets oblong, obtuse or acute, rather shorter than the ovate acute sepals; petals cuneate, much shorter than the sepals; stamens about 10. River valleys: B.C.—Sask.—Mex. *Plain*—*Submont.* Je—Au.

3. *P. millegrana* Engelm. Stem slender, 4-8 dm. high, divaricate, softly pubescent, sometimes nearly glabrous; leaves ternate, finely pubescent; leaflets oblong-cuneate, deeply serrate, 1-6 cm. long, the middle one often petiolulate; flowers 3-4 mm. in diameter; bractlets and sepals oblong-ovate, acute, of about the same length; petals oblong-cuneate, about half as long as the sepals, light-yellow; stamens generally 10; achenes smooth, light-colored, small. *P. leuco-*

carpa Rydb. River valleys: Ill.—Man.—Wash.—Calif.—N.M. *Plain—Submont.* My-S.

4. *P. biennis* Greene. Annual or biennial; stems often several from the root, 3-5 dm. high, finely and rather densely pubescent, often tinged with red or purple; leaves all ternate; leaflets broadly obovate, coarsely crenate, 2-4 cm. long; flowers small, about 5 mm. in diameter; bractlets ovate-lanceolate or oblong, acute, a little shorter than the ovate acute sepals; petals yellow, obovate-cuneate, much shorter than the sepals; stamens about 10; ripe achenes whitish, smooth. Waste places: B.C.—Sask.—Colo.—Ariz.—L. Calif. *Plain—Submont.* My-S.

5. *P. Kelseyi* Rydb. Biennial; stem stout, 6-7 dm. high, glandular-villous; leaves ternate; leaflets obovate or cuneate-obovate, 3-5 cm. long, incised-crenate, sparingly pubescent on both sides; inflorescence rather short and compact; hypanthium 5 mm. wide; bractlets and sepals subequal, 5 mm. long, linear-lanceolate; petals obcordate, apparently white, about half as long as the sepals. Perhaps a hybrid of *P. biennis* and *P. monspeliensis*. Waste places: Mont. *Submont.* Je.

6. *P. monspeliensis* L. Stems stout and very leafy, 3-8 dm. high, often several from the annual or biennial root, hirsute; leaves digitately 3-foliolate, or in luxuriant forms the lower sometimes digitately or pinnately 5-foliolate; leaflets usually obovate, 3-10 cm. long, serrate, flowers about 1 cm. in diameter; bractlets and sepals oblong-lanceolate, acute, nearly of the same length; petals light yellow, obovate, or cuneate, truncate, nearly equalling the sepals; stamens generally 20, sometimes only 15; achenes usually rugulose when ripe. *P. norvegica hirsuta* Michx. Rich soil and waste places: Lab.—D.C.—Kans.—Mex.—Calif.—Alaska; Eurasia. *Plain—Submont.* My-S.

7. *P. pentandra* Engelm. Annual; stems stout, very leafy, 3-7 dm. high, finely hirsute and much branched above; leaflets 2-10 cm. long, oblong to oblanceolate or cuneate, deeply serrate, pubescent on both sides; flowers less than 5 mm. in diameter; bractlets oblong, acute, about 3 mm. long, nearly as long as the ovate acute sepals; petals pale yellow, obovate, scarcely half as long as the sepals; achenes smooth, brownish. Bottom-land: Mo.—Ark.—Sask.—Alta.—Neb. *Plain.* Je-Au.

8. *P. brunnescens* Rydb. Stem 4-5 dm. high, with spreading pubescence; petioles villous with spreading hairs; leaflets 4-7 cm. long, broadly oblanceolate in outline; segments linear, obtuse; hypanthium and calyx villous-strigose; bractlets linear, obtuse, about half as long as the ovate-lanceolate acute sepals; petals yellow, 5-6 mm. long, obovate; stamens 20. Mountains: Colo.—Mont. *Submont.* My-Au.

9. *P. Nuttallii* Lehm. Stem 6-8 dm. high, stout, sparingly hirsute; basal leaves digitate, sparingly hirsute, not at all tomentose beneath; petioles with appressed hairs; leaflets 5-10 cm. long, oblanceolate, toothed or divided nearly halfway to the midrib; hypanthium hirsute, in fruit about 1 cm. in diameter; bractlets linear to lanceolate, generally shorter than the ovate-lanceolate sepals; petals yellow, obovate, emarginate, 6-8 mm. long. Mountain valleys: Sask.—Colo.—Ore.—B.C. *Plain—Mont.* My-Au.

10. *P. juncunda* A. Nels. Stem slightly appressed-pubescent, slender, 4-7 dm. high; basal leaflets 4-7 cm. long, obovate-oblanceolate, green on both sides, nearly glabrous above, slightly appressed-silky beneath, coarsely serrate; hypanthium softly pubescent; bractlets linear-lanceolate, a little shorter than the broadly lanceolate sepals; petals broadly obcordate, 8-10 mm. long. Mountains: Mont.—Colo.—Utah—Ida. *Submont.—Mont.* Je-Au.

11. *P. rectiformis* Rydb. Stem 6-10 dm. high, densely strigose; leaflets oblanceolate or spatulate, 4-6 cm. long, coarsely cut-toothed with lanceolate teeth curved forward, appressed-pubescent on both sides or glabrate above; hypanthium strigose; bractlets linear-lanceolate, 5-7 mm. long, about equalling the ovate-lanceolate acuminate sepals; petals obcordate, 6-7 mm. long. Valleys: Wash.—Ida.—Mont. *Plain—Submont.* Je-Jl.

12. *P. glabrata* (Lehm.) Rydb. Stems slender, 4-6 dm. high; leaflets 2-5 cm. long, oblanceolate or obovate-oblanceolate, glabrous except the veins beneath, cut-toothed about halfway to the midrib; hypanthium strigose; bractlets linear or linear-lanceolate, 3-4 mm. long; sepals ovate, acuminate, 5-7 mm. long; petals obovate, slightly exceeding the sepals. Valleys: Ore.—Wash.—w Wyo. *Submont.* Je-Jl.

13. *P. dascia* Rydb. Stem single, erect, 4-7 dm. high, hirsute; leaflets obovate to oblanceolate, 3-10 cm. long, coarsely and rather densely pubescent on both sides, coarsely cut-toothed about halfway to the midrib; hypanthium hirsute, in fruit 7-8 mm. broad; bractlets linear to lanceolate, 4-5 mm. long, sepals lanceolate, 5-6 mm. long; petals obovate, 7-8 mm. long. Meadows: Wash.—Calif.—Mont. *Submont.* Jl-Au.

14. *P. candida* Rydb. Stem low, 1-2 dm. high, densely white silky-strigose; leaflets 7-9, obovate in outline, 2-4 cm. long, rather thick, deeply incised or cleft; flowers about 1 cm. in diameter; hypanthium white-silky; bractlets lanceolate, much shorter than the ovate sepals, which are about 5 mm. long; petals yellow, obovate, a little exceeding the sepals. Dry places: Nev.—s Utah *Submont.* Je.

15. *P. Pecten* Rydb. Stem 2-3 dm. high, ascending or decumbent at the base, grayish silky-strigose; leaflets 3-4 cm. long, elliptic-ovate or oblanceolate, green and appressed-hairy above, tomentose and silky beneath, dissected one-half to two-thirds to the midrib into oblong acute divisions; bractlets 2-3 mm. long; sepals ovate, acuminate, 4-5 mm. long; petals broadly obovate, slightly if at all exceeding the sepals. Mountains: Mont.—Wyo.—Utah. *Submont.* Je-Au.

16. *P. Bakeri* Rydb. Stem 3-5 dm. high, usually decumbent at the base, loosely hirsute; leaflets oblanceolate, 3-5 cm. long, strongly veined, coarsely appressed-silky on both sides and tomentose beneath, cleft about three-fourths to the midrib into oblong, acutish or obtusish divisions; hypanthium 5-6 mm. broad in fruit; bractlets linear-lanceolate, about 3 mm. long and about half as long as the ovate or ovate-lanceolate sepals; petals obovate, a little exceeding the sepals. Mountain valleys: Wyo.—Colo.—e Calif.—Ida. *Submont.*—Mont. Je-Au.

17. *P. pectinisecta* Rydb. Stem slender, 3-4 dm. high, finely silky-strigose or rarely hirsute; leaflets appressed-silky on both sides and sometimes slightly tomentose beneath, obovate, deeply pectinately divided into oblong or linear segments; hypanthium appressed-silky, in fruit 6-7 mm. broad; bractlets linear-lanceolate, shorter than the broadly lanceolate sepals; petals yellow, obovate, 7-8 mm. long. Dry places: Utah—Wyo.—n Ariz. *Son.*—*Submont.* My-Jl.

18. *P. longiloba* Rydb. Stem stout, 3-5 dm. high, hirsute-strigose and woolly; leaflets 3-5 cm. long, dissected to near the midrib into linear or linear-lanceolate divisions, loosely villous above, densely white-tomentose beneath; hypanthium in fruit 8 mm. broad; bractlets linear-lanceolate, usually equalling the ovate-lanceolate sepals; petals obovate, about 8 mm. long. Meadows: w Mont.—n Ida. *Son.*—*Submont.* My-Jl.

19. *P. Blaschkeana* Turcz. Stem stout, 5-8 dm. high, sparingly silky, 1-2 cm. long; leaves silky or nearly smooth and green above, white-tomentose beneath; leaflets about 5 cm. long, obovate in outline, deeply cleft into linear or oblong divisions, often divergent; hypanthium silky, in fruit often over 1 cm. in diameter; bractlets oblong-lanceolate, often much shorter than the broadly lanceolate or ovate sepals; petals broadly obovate, deeply notched at the apex, much longer than the sepals. *Potentilla ctenophora* Rydb. Meadows: B.C.—n Calif.—n Wyo.—Alta. *Submont.*—Mont. My-Jl.

20. *P. flabelliformis* Lehm. Stem slender, but strict, 4-6 dm. high, silky-strigose; leaves densely silky above, white-tomentose beneath; leaflets 3-5 cm. long, pectinately divided into narrowly linear lobes; hypanthium silky-villous; bractlets linear-lanceolate, much shorter than the triangular-lanceolate acuminate sepals; corolla 10-12 mm. in diameter; petals obovate, a little longer than the sepals. Meadows: B.C.—Sask.—Wyo.—n Calif. *Son.*—*Submont.* Je-Au.

21. *P. intermittens* Rydb. Stems ascending, about 3 dm. high, sparingly hairy; leaflets cuneate-oblancoate, most of them sharply cut-toothed, with lanceolate teeth directed forward, sparingly silky above, grayish tomentose beneath; inflorescence few-flowered; bractlets linear, 4 mm. long; sepals lanceolate, acuminate, 5-6 mm. long; petals obcordate, 6-7 mm. long. Perhaps a hybrid between *P. glaucophylla* and *P. filipes*. Mountains: Alta.—Colo.—Nev. *Submont.*—*Mont.* Je—Au.

22. *P. viridescens* Rydb. Stem 5-7 dm. high, sparingly silky with appressed or slightly spreading hairs; leaves silky, but green above, silky and somewhat tomentulose beneath; leaflets oblanceolate or spatulate, deeply toothed or divided nearly halfway to the midrib, with lanceolate often somewhat divergent teeth; hypanthium silky; bractlets lanceolate, a little shorter than the ovate-lanceolate sepals; corolla 10-15 mm. in diameter; petals obcordate, equalling or slightly exceeding the sepals. Valleys: Man.—Alta.—Wyo. *Submont.*—*Mont.* My—Au.

23. *P. glomerata* A. Nels. Stem stout, 4-8 dm. high, softly pubescent with appressed or slightly spreading hairs; leaflets 4-8 cm. long, oblanceolate or narrowly obovate, cut-toothed, green, but densely appressed-hairy above, more or less tomentose beneath; sepals broadly lanceolate, acuminate, 5-8 mm. long; petals rounded-obcordate, 6-8 mm. long. River bottoms: Wash.—Calif.—Wyo.—*Mont.* *Submont.*—*Mont.* Je—Au.

24. *P. dichroa* Rydb. Stems strict, 4-6 dm. high, densely white-strigose; leaflets oblanceolate, 3-6 cm. long, green and appressed-silky above, white-tomentose and silky beneath, cut-toothed nearly halfway to the midrib; hypanthium silky; bractlets lanceolate, 3-4 mm. long; sepals ovate, acute, 6 mm. long; petals obcordate, 7-8 mm. long. Meadows: w Mont.—Ore.—Nev.—Utah. *Submont.* Je—Au.

25. *P. gracilis* Dougl. Stem 4-7 dm. high, slender, slightly silky-villous; leaflets 3-6 cm. long, oblanceolate, green and nearly glabrous above, densely and finely white-tomentose beneath, divided about halfway to the midrib; bractlets lanceolate, a little shorter than the ovate-acuminate sepals; corolla 15-20 mm. in diameter; petals obcordate, deeply emarginate, often over 1 cm. long, much exceeding the sepals. Meadows: B.C.—w Mont.—Ore. *Submont.* Je—S.

26. *P. camporum* Rydb. Stem simple, strict, 3-4 dm. high, hirsute with spreading or reflexed hairs; leaflets obovate or broadly oblanceolate, 2-5 cm. long, cut-toothed, densely hirsute-strigose above, white-tomentose and silky beneath; bractlets lanceolate, 3-4 mm. long; sepals ovate-lanceolate, 4-5 mm. long; petals obcordate, 5-6 mm. long. Meadows: (Black Hills) S. D.—Man. *Plain.* Je—Jl.

27. *P. filipes* Rydb. Stems 3-5 dm. high, slender, silky-hirsute or silky-strigose; leaflets obovate to oblanceolate, obtuse, coarsely crenate, 2-6 cm. long, green and sparingly strigose above, white-tomentose beneath; bractlets linear-lanceolate, a little shorter than the lanceolate acute sepals; petals yellow, broadly obcordate, 6-8 mm. long, exceeding the sepals. *P. hippiana pulcherrima* S. Wats. *P. gracilis* Porter & Coulter, not Dougl. Mountains, valleys: Man.—N M.—Utah—Alta. *Submont.*—*Mont.* Je—Au.

28. *P. subjuga* Rydb. Tufted; stems many, 1-3 dm. high, silky-villous, few-leaved; leaflets 1-4 cm. long, oblong or obovate, deeply incised into oblong, rather obtuse segments, silky and green above, silky and white-tomentose beneath; bractlets oblong, obtuse or acute, about a third shorter than the triangular-lanceolate sepals; petals broadly obcordate, exceeding the sepals. Mountains: Colo. *Mont.*

29. *P. Vreelandii* Rydb. Stems ascending, 1.5-2 dm. high, glabrous and straw-colored below, sparingly pubescent above; basal leaves 5-foliolate, digitate, or pinnate with closely approximate leaflets; leaflets cuneate or obovate-cuneate, glabrous or ciliate on the margins and veins, more or less glaucous, 1-2 cm. long, crenate with rounded-ovate teeth at the apex; inflorescence 1-4-flowered; bractlets elliptic or oblong, obtuse, about 3 mm. long; sepals ovate, acute, 4-5 mm. long; petals broadly obcordate, about 7 mm. long. Mountains: Mont. *Subalp.* Au.

30. *P. diversifolia* Lehm. Stem erect, few-leaved, smooth or strigose, 1-2 dm. (rarely 3 dm.) high; basal leaves digitate, or often pinnate with approximate leaflets, or both in the same plant, more or less silky-strigose, especially beneath; leaflets most commonly 7, oblanceolate, cuneate, or sometimes obovate, more or less toothed; bractlets and sepals lanceolate, acute, 3.5-5 mm. long; petals obcordate or obovate and emarginate, 6-7 mm. long, about one-third longer than the sepals. *P. dissecta* Nutt., not Pursh. Mountain valleys: Sask.—B.C.—Calif.—Colo. *Submont.*—*Alp.* Je—Au.

31. *P. glaucophylla* Lehm. Stems 1.5-4 dm. high, glabrous below, sparingly strigose above; leaflets oblanceolate-cuneate, 1-5 cm. long, coarsely serrate, with acute teeth directed forward, strigose when young, soon glabrate, glaucous; cyme 3-12-flowered; bractlets lanceolate, 3-5 mm. long, acute; sepals ovate, acuminate, 5-7 mm. long; petals obcordate, 6-10 mm. long. *P. diversifolia glaucophylla* Lehm. *P. dissecta glaucophylla* S. Wats. Mountain valleys: B.C.—Sask.—N.M.—Utah. *Submont.*—*Subalp.* Je—Au.

32. *P. perdissecta* Rydb. Stems 0.5-2 dm. high, when young slightly silky-strigose, glabrate in age; leaflets 1-3 cm. long, obovate in outline, the two lower much smaller, all deeply cleft into oblong or lanceolate acute divisions, glabrous or nearly so, shining; bractlets oblong, obtuse, much shorter than the ovate-lanceolate acute sepals; petals much longer than the sepals, 5-8 mm. long. High mountains: B.C.—Alta.—Wyo.—Utah. *Submont.*—*Mont.* Je—Au.

33. *P. multisecta* (S. Wats.) Rydb. Stem erect, slender, 1-2 dm. high, more or less silky-strigose; leaves more or less silky, digitate, or pinnate with approximate leaflets; leaflets 3-7, the lower smaller, all dissected into linear or linear-oblong divisions; bractlets and sepals oblong-lanceolate, acute, 3-4 mm. long; petals obcordate, about one-half longer than the sepals. *P. diversifolia multisecta* S. Wats. *P. dissecta multisecta* S. Wats. High mountains: Mont.—B.C.—Wyo.—Nev. *Mont.* Je—Jl.

34. *P. fastigiata* Nutt. Stem low, 1-3 dm. high, ascending, generally quite densely silky, rather simple; leaves silky-villous with rather long hairs on both sides and slightly tomentose beneath; leaflets obovate, 1-3 cm. long, coarsely crenate or somewhat incised; cyme usually rather dense; bractlets linear-lanceolate, shorter than the triangular-ovate acute sepals; corolla 10-15 mm. in diameter; petals broadly obcordate, a little exceeding the sepals. Meadows: Mont.—Wyo.—Nev. *Submont.* Je—Jl.

35. *P. concinnaeformis* Rydb. Stems about 1 dm. high, ascending, slightly silky-strigose, subscapose; basal leaves numerous, densely silvery-silky on both sides and slightly tomentose beneath; leaflets 1-2 cm. long, oblong-cuneate, crenate except at the base; bractlets oblong-lanceolate, about a third shorter than the broadly lanceolate sepals; petals yellow, obcordate, a third longer than the sepals. Mountains: Ariz.—s Utah. *Subalp.* Je—Jl.

36. *P. concinna* Richards. Stems many, spreading, more or less tomentose; leaves densely white-tomentose beneath, silky and slightly tomentose above when young, digitate (sometimes approximately pinnate); leaflets obovate or cuneate, more or less deeply toothed, 1-3 cm. long; sepals ovate, acute, 4-5 mm. long; petals obcordate, a little exceeding the sepals, about 6 mm. long. Dry hills and mountains: Colo.—Sask.—Alta.—Ida. *Plain*—*Mont.* My—Jl.

37. *P. bicrenata* Rydb. Stem erect to spreading, 5-7 cm. high, about equalling the leaves, 1-3-flowered; basal leaves digitately 5-foliate, silky and greenish above, white-tomentose beneath; leaflets 0.5-3 cm. long, oblong-cuneate; sepals ovate or lance-ovate, about 4 mm. long; petals obovate, truncate or emarginate, 5-6 mm. long. Dry hills: N.M.—Wyo. *Submont.* Je.

38. *P. divisa* Rydb. Stems spreading or diffuse, 5-10 cm. long, pubescent with long white hairs; basal leaves 5-foliate, digitate, or pinnate with approximate leaflets; leaflets 1-2 cm. long, obovate or oblanceolate in outline, deeply cleft, with oblong or lanceolate divisions, pubescent above with long white hairs, densely white-tomentose beneath; sepals ovate, about 4 mm. long; petals broadly cuneate, emarginate, about 5 mm. long. *P. nivea dissecta* S. Wats. *P. concinna*

divisa Rydb. Dry hills: (Black Hills) S.D.—Sask.—Alta.—Colo. *Submont.*—*Alp.* Je—Jl.

39. *P. quinquefolia* Rydb. Stems generally several, ascending, 1.5–2 dm. high, rather loosely silky-villous; basal leaves rather many, 5- (seldom 3-) foliolate, usually with the terminal leaflet short-petiolulate, silky-villous above, white-tomentose beneath; leaflets broadly obovate, cleft about halfway to the midrib into oblong segments, 1.5–3 cm. long; sepals lanceolate, 4 mm. long; petals obovate, emarginate, a little exceeding the sepals. *P. nivea pentaphylla* Lehm. *P. nivea quinquefolia* Rydb. *P. subquinnata* Rydb. Mountains and hills: Sask.—B.C.—Colo.—Utah. *Plain*—*Alp.* Je—Jl.

40. *P. modesta* Rydb. Stems ascending, about 1 dm. high, several-flowered; basal leaves digitately 5-foliolate, or 3-foliolate; leaflets broadly obovate, 1–1.5 cm. long, silky, but green above, white-tomentose beneath, deeply cleft into oblong or lanceolate divisions; inflorescence few-flowered, rather dense, the pedicels short; sepals lance-ovate, acute, 3 mm. long; petals 3–4 mm. long, obcordate. High mountains: Utah. *Submont.*—*Subalp.* My—Jl.

41. *P. Hookeriana* Lehm. Stems several from the caudex, 1–2 dm. high, white-tomentose and silky-villous, ascending; leaves ternate, or occasionally with a pair of small extra leaflets, white on both sides, silky-villous above, densely tomentose beneath; leaflets obovate in outline, 1–2 cm. long, deeply cleft to near the midrib into oblong lobes; flowers in small dense cymes, about 8–10 mm. in diameter; sepals lanceolate, acute; petals obcordate, generally a little exceeding the sepals; styles short, a little thickened and glandular at the base. Hills and plains: Sask.—Alta.—Mont. *Plain*—*Submont.* Je—Jl.

42. *P. nivea* L. Stems several, 1–2 dm. high, more or less tomentose or villous, few-leaved; leaves ternate, glabrate or slightly villous above, densely white-tomentose beneath; leaflets oblong-cuneate or obovate, 2–3 cm. long, generally coarsely crenate; cyme 2–6-flowered; flowers 12–15 mm. in diameter; sepals lanceolate, acute, 5–6 mm. long; petals obcordate, exceeding the sepals, 6–8 mm. long. Arctic and alpine regions: Alaska—Greenl.—Que.—Colo.; Eurasia. *Alp.*—*Subalp.* Jl—Au.

43. *P. uniflora* Ledeb. Stems about 5 cm. high, slightly villous or tomentose, 1–2-flowered; leaves crowded, ternate, silky or glabrate above, densely white-tomentose beneath; leaflets 1–1.5 cm. long, broadly cuneate or rhombic-obovate, deeply cut from the apex into coarse oblong-lanceolate teeth; sepals ovate-lanceolate, acute, 4–5 mm. long; petals yellow, obcordate, 6–8 mm. long. Arctic-alpine regions: Alaska—Orc.—Hudson Bay—Colo.; Asia. *Alp.*—*Subalp.* Je—Au.

44. *P. emarginata* Pursh. Stems 2–10 cm. high, generally 1–2-flowered, pilose or softly villous-hirsute; leaves ternate, pilose on both sides; leaflets 0.5–1.5 cm. long, broadly obovate, with a cuneate base and broad teeth; sepals acute, ovate; petals broadly obcordate, a little exceeding the sepals, 5–8 mm. long. *P. nana* Willd. Arctic-alpine regions: Lab.—Greenl.—Alaska—Canadian Rocky Mountains; Siberia and Spitzbergen. *Alp.* Jl—Au.

45. *P. flabellifolia* Hook. Stems 2–3 dm. high, minutely puberulent, few-leaved; leaves ternate, very thin, short-pubescent or glabrate; leaflets cuneate-flabelliform, deeply serrate, with obtuse teeth, entire towards the base; bractlets oval, obtuse or acutish, equalling the sepals, 5–6 mm. long; petals obovate-cuneate, deeply emarginate, 8–10 mm. long. *P. trina* A. Nels. Mountains: B.C.—Ida.—c Calif. *Submont.*

46. *P. brevifolia* Nutt. Stems less than 1 dm. high, slender, 1–2-leaved, glandular-puberulent; leaflets suborbicular, with cuneate base, 2–3-cleft and crenate, 0.5–1 cm. long; sepals broadly ovate and acute or slightly mucronate, 4 mm. long; petals a little longer than the sepals, yellow, obovate, and often a little notched. High mountains: Ore.—w Wyo. *Mont.*—*Subalp.* Au.

47. *P. tenerrima* Rydb. Stems many, very slender, generally tinged with red, 1–1.5 dm. high, sparingly strigose; leaves pinnate, with 2 pairs of leaflets, finely silky and a little grayish-tomentulose beneath; leaflets obovate or oblan-

ceolate in outline, divided to near the midrib into linear acute segments; sepals narrowly lanceolate, about 4 mm. long; petals obovate, slightly retuse, a little exceeding the sepals. Mountains: Colo. *Subalp.* Jl.

48. *P. saximontana* Rydb. Stems ascending or prostrate, generally not much over 1 dm. high, appressed silky-strigose, more or less leafy and branched; leaves pinnate, with 2-3 approximate pairs of leaflets, silky above, more or less white-tomentulose beneath; leaflets 5-20 mm. long, obovate or oblong in outline, deeply dissected into narrowly oblong segments; cyme rather few-flowered; sepals lanceolate, acute, 4-5 mm. long; petals obcordate, 6-8 mm. long. *P. rubricaulis* Rydb., not Lehm. *P. rubripes* Rydb. Alpine regions. Utah—Colo.—Alta. *Alp*—*Subalp.* Je—Au.

49. *P. minutifolia* Rydb. Stems about 1 dm. long, slender, 1- or 2-leaved, sparingly silky or nearly glabrous; basal leaves very small, slightly grayish beneath, pinnate, with two pairs of leaflets, the upper pair and the sessile odd leaflet about 5 mm. long, the lower pair only 2-3 mm.; leaflets obovate, incised, with oval rounded segments; flowers 1 or 2; sepals lanceolate, obtuse or acutish, about 4 mm. long; petals obcordate, about half longer than the sepals. Mountains: Colo. *Alp*—*Mont.* Jl.

50. *P. filicaulis* (Nutt.) Rydb. Stems several from the caudex, erect or ascending, 1 dm. high or less, silky-strigose, few-leaved; basal leaves many, pinnate, with 2 or 3 pairs of approximate leaflets, or subdigitately 5-7-foliolate, densely silky on both sides and slightly tomentose beneath; leaflets cuneate, 1-2 cm. long, coarsely serrate, with ovate teeth; cyme few-flowered; sepals ovate or ovate-lanceolate, acute, 4-5 mm. long; petals obcordate, 5-6 mm. long. *P. effusa filicaulis* Nutt. Mountains: Colo.—Ida. *Mont.* Jl.

51. *P. Macounii* Rydb. Stems usually more than one from the caudex, ascending, silky-villous, less than 1 dm. high, 1- or 2-leaved; basal leaves many, pinnate, with 3-5 pairs of rather approximate leaflets, silky on both sides and somewhat tomentose beneath; leaflets cuneate, about 1 cm. long, deeply cleft into oblong segments; cyme few-flowered; sepals ovate, 4-5 mm. long; petals obcordate, 5-7 mm. long. Rocky slopes: Alta.—*Mont.* *Submont.*—*Mont.* Je—Au.

52. *P. proxima* Rydb. Stems less than 1 dm. high, decumbent or ascending, grayish silky-strigose; basal leaves pinnate, with 7 approximate leaflets, leaflets 7-15 mm. long, obovate, serrate, silky on both sides and white-tomentose beneath; sepals lanceolate, 4 mm. long; petals obcordate, 5 mm. long. Mountains: Utah—Ariz. *Subalp.* Jl—Au.

53. *P. coloradensis* Rydb. Stems several, rather slender, silky-tomentose, in age glabrate, about 3 dm. high, branched; leaflets 9-13, finely tomentose, or in age more glabrate; leaflets cuneate-ob lanceolate, incisely serrate, with triangular acute teeth; bractlets linear-lanceolate; sepals lanceolate acuminate, about 4 mm. long; petals obcordate, scarcely exceeding the sepals; pistils 10-15 (rarely 20). Mountains: Colo.—Wyo. *Mont.* Jl—Au.

54. *P. rupicola* Osterhout. Stems slender, 2-3 dm. high, glabrous except for a few stiff pointed hairs, erect or nearly so; leaflets of the basal leaves 5-7, narrowly cuneate, 1-1.5 cm. long, sharply serrate above, glabrous, except the ribs and margins, which are slightly ciliate; sepals narrowly lanceolate, acuminate, 3-4 mm. long; petals broadly obovate, retuse, about the length of the sepals; pistils about 6. Mountains: n Colo. *Submont.*—*Mont.* Jl—Au.

55. *P. effusa* Dougl. Stems many, 2-4 dm. high, slightly silky, ascending or diffuse; basal leaves usually interruptedly pinnate, grayish tomentose on both sides; leaflets 5-11, cuneate-oblong or oblanceolate, the upper often confluent, crenate, with broad usually ovate teeth; sepals lanceolate-acuminate, 4-5 mm. long; petals obovate, retuse, a little longer than the calyx. Plains and hills: Alta.—Sask.—Neb.—N.M. *Plain*—*Mont.* Je—Au.

56. *P. lupina* Rydb. Stem 3-4 dm. high, nearly erect, densely grayish pubescent with coarse ascending hairs; basal leaves pinnate, with about 7 approximate leaflets; leaflets oblanceolate, 2-5 cm. long, coarsely crenate, densely

on the stolons. Hypanthium almost flat. Bractlets, sepals, and petals normally 5. Petals yellow, broadly elliptic or almost orbicular, not at all unguculate. Stamens 20–25, in three series, inserted as in *Potentilla*, filaments filiform; anthers didymous, deliscent by a longitudinal slit. Receptacle hemispheric, bearing very numerous pistils. Styles filiform, lateral, scarcely deciduous. Mature achenes with thick pericarp. Seeds ascending and amphitropous.

Achenes corky, with a deep groove; stem and petiole and rachis of the leaves densely pubescent, with at first ascending and later spreading hairs.

Leaves silvery on both sides.

Leaves green and glabrate above.

Achenes not corky, without a groove, stem and petiole and the rachis of the leaves glabrous or slightly appressed-hairy and glabrate, hypanthium acute at the base.

1. *A. argentea*.

2. *A. Anserina*.

3. *A. subarctica*.

1. *A. argentea* Rydb. Basal leaves 1–2 dm. long, pinnate, with 11–25 larger leaflets and smaller ones interposed; larger leaflets 1–3 cm. long, obovate, rounded at the apex, serrate, white-silky on both sides or slightly greener above; bractlets usually entire, about equalling the ovate or ovate-lanceolate sepals; petals obovate or broadly oval, 6–9 mm. long. Wet places: Mack.—S.D.—N.M.—Ariz.—Ore.—B.C. *Plain—Mont.* My—Au.

2. *A. Anserina* (L.) Rydb. Leaves 1–2 dm. long, interruptedly pinnate, with 9–31 larger leaflets and smaller ones interposed, spreading or flat on the ground, slightly silky and green above, white-silky and tomentose beneath; larger leaflets 1–4 cm. long, oblong or oblanceolate, usually acute, deeply and sharply serrate; bractlets simple and lanceolate, or ovate-lanceolate, toothed or divided, generally a little longer than the broadly ovate sepals; petals oval, 7–10 mm. long. Wet places: Newf.—N.Y.—Calif.—Alaska; Eurasia. *Plain—Mont.* My—Au.

3. *A. subarctica* Rydb. Basal leaves 7–15 cm. long, ascending; rachis silky, with appressed or ascending hairs; larger leaflets 15–19, dark green and sparingly silky above, densely white-silky and tomentose beneath, deeply serrate, the upper leaflet 1.5–2 cm. long; hypanthium about 5 mm. wide, silky and tomentulose, acute at the base; bractlets linear-lanceolate, 3–6 mm. long; sepals ovate, 5–6 mm. long; petals oval or suborbicular, about 8 mm. long. Wet places: Alaska—Yukon—Ida.—Mont. *Mont.—Subalp.* Je—Au.

14. *CÓMARUM* L. MARSH CINQUEFOIL, PURPLE MARSHLOCKS, COWBERRY.

Aquatic perennials, with long creeping rootstocks and pinnate leaves. Inflorescence cymose. Hypanthium almost flat or slightly saucer-shaped, enlarging in fruit, more or less tinged with red. Bractlets, sepals, and petals 5. Petals red, ovate, acuminate. Stamens 20–25, inserted near the base of the receptacle; filaments filiform, stout, anthers flat, cordate at the base, attached by the back, and opening by longitudinal marginal slits. Receptacle hemispheric, enlarging in fruit and becoming ellipsoid or hemispheric and spongy. Pistils numerous. Styles lateral, filiform. Seeds amphitropous.

1. *C. palustre* L. Stem ascending, 2–5 dm. high, more or less hirsute, with short spreading hairs, somewhat glandular on the upper portion; leaves pinnate, with 5–7 more or less approximate leaflets, green above, paler and purple-veined beneath, sparingly hairy, in age glabrate; leaflets elliptic or oval, mostly acute at both ends, to linear-oblong, 5–8 cm. long and only 1–2 cm. wide, obtuse or rounded at the apex; hypanthium in flower 7–8 mm., in fruit about 15 mm. in diameter, short-pilose and glandular-pubescent; sepals ovate to lanceolate, acuminate, about 1 cm. long in flower and 1.5 cm. in fruit; petals spatulate or ovate, acuminate or acute, scarcely half as long as the sepals. Wet bogs: Greenl.—Lab.—N.H.—Wyo.—Calif.—Alaska. *Mont.* JI—S.

15. *FRAGARIA* L. STRAWBERRY.

Perennial acaulescent herbs, with scaly rootstock, and producing runners which root and form new plants. Leaves (in all ours) ternate, basal Hypanthium almost flat. Bractlets, sepals, and petals normally 5. Petals white, or

in one species reddish, broadly obovate, elliptic, or almost orbicular, obtuse, never emarginate. Stamens about 20, in three series as in *Potentilla*, closely surrounding the base of the receptacle; filaments short; anthers dehiscent by a longitudinal slit. Receptacle hemispheric or conic, bearing very numerous pistils, in fruit becoming enlarged, very juicy, and delicious in taste. Styles filiform, but rather short, attached near the middle of the ovaries. Seeds ascending and amphitropous.

Pubescence of scape and petioles divaricate, i. e., generally spreading at right angles or somewhat reflexed (scanty and less spreading in no. 3).

Leaflets sessile, achenes superficial on the receptacle.

Flowers pinkish, nodding from the beginning

1. *F. Helleri*.

Flowers white, erect or spreading, nodding only in fruit.

Calyx in fruit spreading or ascending, scape generally with long divaricate hairs and a leafy bract.

2. *F. bracteata*.

Calyx in fruit reflexed, leaflets rhombic-obovate, acute, scape and petioles sparingly hairy, hairs more ascending or appressed.

3. *F. americana*.

Leaflets usually petiolulate, achenes set in usually deep pits

Plant more or less glaucous, petals usually orbicular and twice as long as the sepals

4. *F. truncata*.

Sepals and bractlets elliptic.

Sepals and bractlets lanceolate

Sepals linear-lanceolate, leaflets cuneate, somewhat coriaceous, sharply toothed at the apex

5. *F. cuneifolia*.

Sepals broadly lanceolate; leaflets broadly obovate or broadly cuneate, only a little longer than broad, with coarse acute teeth.

6. *F. platypetala*.

Plant not glaucous; petals elliptic, generally exceeding the sepals by one-half, usually over 10 mm. long, achenes set in shallow pits, leaves firm.

7. *F. grandiflora*.

Pubescence of the scape and petioles appressed or ascending, achenes in pits.

Plants not glaucous

Leaflets usually more than 3 cm. long, very velvety beneath, runners many

8. *F. prolifica*.

Leaflets usually 1-3 cm. long, not very velvety, runners few.

9. *F. pumila*.

Plants more or less glaucous

Leaves rather thin.

Leaflets obovate, scape several-flowered.

10. *F. glauca*.

Leaflets oblong-cuneate, scape 1-4-flowered

11. *F. pauciflora*.

Leaves rather thick, firm, leaflets oblong-cuneate.

12. *F. ovalis*.

1. ***F. Helleri* Holz.** Leaflets rounded-obovate or rhombic-obovate, coarsely serrate, very thin, glabrate above, finely silky beneath; scape 1.5-2 dm. high, often with a foliaceous unifoliate bract; flowers 1.5-2 cm. in diameter; sepals ovate; petals nearly orbicular, twice as long as the sepals. Woods: Ida.—Wash. Submont. Je-Jl

2. ***F. bracteata* Heller.** Leaflets broadly rhombic-obovate, acute, coarsely toothed, 2-5 cm. long, very thin, somewhat glaucous, silky when young, glabrate in age; scape often over 1 dm. high, often exceeding the leaves, 2-8-flowered; flowers 1.5-2 cm. in diameter; sepals and bracts lanceolate, acute; petals rounded-obovate, often nearly twice the length of the sepals; fruit ovoid or semi-ellipsoid, red, about 7.5 mm. in diameter and 10 mm. long. *Fragaria retrorsa* Greene. Woods: B.C.—Calif.—N.M.—Mont. Submont.—Subalp. My-S.

3. ***F. americana* (Porter) Britton.** Leaflets 3-8 cm. long, rhombic-obovate, mostly acute, sharply and deeply serrate, very thin, very soon glabrate on both sides; scape slender, seldom over 1.5 dm. high, seldom much exceeding the leaves, very rarely leafy-bracteate; fruit elongate-ovoid, 5-7.5 mm. in diameter and 1-1.5 cm. long. *Fragaria vesca americana* Porter. Woods: Newf.—Man.—N.M.—Va. Submont.—Mont. Je-Au.

4. ***F. truncata* Rydb.** Leaflets petiolulate, 1.5-4 cm. long, rounded-obovate, round-crenate above the middle, with the middle tooth smaller, thin, silky on both sides, but in age glabrate above; scape slender, few-flowered, seldom exceeding 1 dm. in height, and rarely leafy-bracteate; flowers 1-2 cm. in diameter; bractlets and sepals elliptic or ovate, obtuse or acutish; petals obovate, exceeding the sepals by about a third. Mountains: Calif.—Nev.—Ida. Submont. Je.

5. ***F. cuneifolia* Nutt.** Leaflets cuneate to obovate, obtuse or truncate, toothed only at the apex, 1.5-4 cm. long, firm and somewhat coriaceous, silky

above when young, glabrate in age, densely silky and slightly tomentulose beneath; scape slender, less than 1 dm. high; flowers 1.5-2 cm. in diameter; bractlets and sepals linear-lanceolate; petals obovate-cuneate, a third longer than the sepals; fruit subglobose, about 1 cm. in diameter, villous. Mountains: B.C.—Ore.—Ida. *Submont.* My-Jl.

6. *F. platypetala* Rydb. Leaflets broadly cuncate or obovate, 2-8 cm. long, coarsely serrate or crenate above the middle, moderately thick, glabrous and glaucous above and appressed-silky beneath; scape about 1 dm., seldom 2 cm. high, often leafy-bracteate; flowers large, 1.5-2.5 cm. in diameter; sepals and bractlets lanceolate; petals almost orbicular, usually twice as long as the sepals; fruit hemispheric, 1-1.5 cm. in diameter. *F. latiuscula* Greene. Hills: Alaska—Calif.—Utah—Wyo.—Mont. *Submont.*—*Mont.* My-Jl.

7. *F. grandiflora* Ehrh. Leaflets 4-15 cm. long, broadly obovate, coarsely toothed, usually rounded at the apex, rather firm, very dark green, glabrate and somewhat shining above, paler beneath and silky on the veins, scape 1-2 dm. high, usually shorter than the leaves; flowers over 2 cm. in diameter; bractlets lanceolate, about equalling the ovate acuminate sepals; petals rounded-obovate, over 1 cm. long; fruit 2-3 cm. in diameter, often acutish at the apex, sometimes laterally flattened or irregular in outline. Waste places: Calif.—B.C.; in the East; escaped from cultivation; native of S. Am. My-Jl.

8. *F. prolifica* Baker & Rydb. Leaflets obovate, rounded at the apex, coarsely toothed with very broad teeth, rather thin and dark green, glabrous above, sparingly silky or glabrate and strongly veined beneath; runners very numerous; scapes many-flowered, appressed-strigose, seldom over 1 dm. high; flowers about 1 cm. in diameter; sepals and bractlets ovate-lanceolate; petals obovate, a little exceeding the sepals; fruit hemispheric, 1-1.5 cm. in diameter. Mountains: Colo. *Submont.*—*Mont.* My-Au.

9. *F. pumila* Rydb. Leaflets oblong or narrowly obovate, 1-3 cm. long, crenate, small and thick, dark green and silky above when young, soon glabrate, silky-strigose and finely puberulent beneath; scape few-flowered, usually about 5 cm. long; flowers 1-1.5 cm. in diameter; petals obovate, exceeding the sepals by about a half; fruit scarcely 1 cm. in diameter. Dry hills: N.D.—Colo.—Wyo. *Submont.*—*Subalp.* My-Jl.

10. *F. glauca* (S. Wats.) Rydb. Leaflets broadly obovate, 3-5 cm. long, coarsely toothed, thin, glaucous and almost glabrous above, silky or at last glabrate beneath; scape slender, rarely exceeding the leaves; flowers 1.5-2 cm. in diameter; petals obovate, exceeding the sepals by about a half; fruit subglobose, 1-1.25 cm. in diameter. *Fragaria virginiana* (?) *glauca* S. Wats. Mountains: B.C.—Nev.—N.M.—S.D.—Mack. *Plain*—*Subalp.* My-Au.

11. *F. pauciflora* Rydb. Leaflets cuneate, subsessile, coarsely toothed above the middle, the lateral ones scarcely at all oblique at the base, thin and glaucous, almost glabrous above and soon glabrate beneath; scape 2-4-flowered, 5-15 cm. long, seldom exceeding the leaves; flowers 1-1.5 cm. in diameter; petals obovate; fruit subglobose, about 1 cm. in diameter; achenes set in very deep pits. Hills: Hudson Bay—Colo.—Alta. *Plain*—*Mont.* Je-Au.

12. *F. ovalis* (Lehm.) Rydb. Leaflets subsessile or short-petiolulate, oblong or cuneate, 2-3 cm. long, toothed above the middle, thick and firm, somewhat glaucous, glabrate above, rather densely silky beneath; scape short, not much over 5 cm. high; flowers 1-1.5 cm. in diameter; petals obovate, exceeding the sepals by a half; fruit subglobose, about 1 cm. in diameter. *F. firma* Rydb. Dry hills: Ariz.—N.M.—Wyo. *Son.*—*Mont.* Je-Au.

16. *SIBBÁLDIA* L.

Low, tufted perennial herbs, with short caespitose caudices or rootstocks and ternate leaves. Hypanthium saucer-shaped or cup-shaped, small. Bractlets, sepals, and petals 5. Petals yellow, obovate, cuneate, or oblanceolate, scarcely equalling the sepals. Stamens 5, inserted not very close to the small receptacle;

filaments filiform, but short, inclined. Pistils 5-20; styles lateral. Ovule and seed attached near the base of the style, ascending and amphitropous.

1. *S. procumbens* L. Stems less than 1 dm. high, more or less hirsute-strigose; leaflets sparingly appressed-pilose, 1-2 cm. long, broadly cuneate, 3-5-toothed at the apex; flowers few in rather dense cymes; bractlets and sepals subequal, broadly oblong or ovate; petals yellow, spatulate, shorter than the sepals. Arctic and alpine regions: Greenl.—N.H.—Colo.—Calif.—Alaska; arctic and alpine Eurasia. *Alp.*—*Subalp.* Je—Au.

17. *DASIPHORA* Raf. SHRUBBY CINQUEFOIL, YELLOW ROSE.

Shrubs, with scarious sheathing stipules, pinnate leathery leaves, and axillary flowers. Hypanthium saucer-shaped. Bractlets, sepals, and petals 5. Petals in ours yellow, nearly orbicular, neither unguiculate nor emarginate. Stamens about 25, in 5 festoons on a pentagonal disk; filaments filiform; anthers oblong, flat, not didymous, dehiscent by a longitudinal slit along the margin. Receptacle hemispheric, with numerous pistils; styles club-shaped, thick and glandular upward, inserted near or below the middle of the ovaries; stigmas large and evidently four-lobed; achenes densely covered with long straight hairs. Seeds ascending and amphitropous.

1. *D. fruticosa* (L.) Rydb. Shrub 3-15 dm. high; branches with brownish shreddy bark; leaves pinnate, with 3-7 approximate leaflets, silky above, silky and whitish beneath; leaflets oblong or linear-oblong; flowers in small loose cymes or solitary, large, 1.5-3 cm. in diameter; petals yellow, orbicular, often twice as long as the sepals. Cold valleys and among rocks: Lab.—Alaska—Calif.—N.M.—N.J.; w Eu.; c Asia. *Submont.*—*Subalp.* Je—Au.

18. *DRYMOCALLIS* Fourr.

Perennial herbs, with scaly rootstocks, glandular foliage, pinnate leaves, and cymose inflorescence. Hypanthium saucer-shaped or hemispheric. Bractlets, sepals, and petals 5. Petals obovate, elliptic, or nearly orbicular, neither unguiculate nor emarginate, yellow or white. Stamens 20-30, in 5 festoons on the much thickened pentagonal disk around the receptacle; filaments filiform; anthers oblong, truncate at each end or cordate at the base, flat and dehiscent by longitudinal marginal slits. Receptacle hemispheric or semi-ellipsoid, with very numerous pistils. Style nearly basal, in all our species except one thickened and glandular a little below the middle and tapering to each end; stigma minute. Seed attached near the base of the ovary, ascending and orthotropous.

Style fusiform, less than twice as long as the ovary.

Sepals ovate to lanceolate, acute, rarely acuminate

Petals white or cream-colored, often, however, turning more yellowish in drying.

Petals slightly if at all exceeding the sepals. Inflorescence many-flowered, dense.

Leaves densely hairy, petals orbicular or nearly so, 7-8 mm. long; cyme short and dense. stem densely short-hairy. 1. *D. agrimonioides*.

Leaves sparingly hairy, petals obovate, 5-6 mm. long.

Cyme short, flat-topped; leaflets rounded-obovate to flabelliform, stem and petioles not conspicuously long-hairy. 2. *D. corymbosa*.

Cyme elongate, narrow; leaflets more or less rhombic-obovate; stem and petioles conspicuously long-hairy, especially below.

3. *D. convallaria*.

Petals much exceeding the sepals, cyme open, few-flowered; stem slender.

4. *D. pseudorupestris*.

Petals yellow in anthesis

Leaflets with ovate teeth

Petals much exceeding the sepals in length

Bractlets lanceolate to linear, sepals lanceolate or ovate-lanceolate.

Plant tall, 3-10 dm. high, cyme flat-topped.

Leaflets rhombic-obovate, acute, at least the terminal one; inflorescence leafy 5. *D. foliosa*.

Leaflets of the basal leaves orbicular to obovate, obtuse; upper leaves reduced. 6. *D. valida*.

Plant low, 2-3 dm. (rarely 4 dm.) high, cyme narrow, leafy; leaflets orbicular or rounded-obovate. 7. *D. fissa*.

Bractlets elliptic or oval; sepals ovate; stem 1-1.5 dm. high, almost scapose. 8. *D. pumila*.

Petals slightly if at all exceeding the sepals, 5-7 mm. long.

Bractlets linear-lanceolate, about two-thirds as long as the lanceolate sepals; leaflets obovate, irregularly or doubly toothed.

9. *D. glandulosa*.

Bractlets oblong or oblong-lanceolate; sepals ovate-lanceolate, leaflets more evenly simple-toothed, the lateral ones inclined to be orbicular.

10. *D. arizonica*

Leaflets incised, with lanceolate teeth.

11. *D. incisa*

Sepals oval or broadly ovate, rarely lanceolate, rounded and mucronate at the apex.

Petals 7-8 mm. long, ascending in anthesis, leaves densely hairy, plant stout.

1. *D. agrimonioides*

Petals less than 6 mm. long, spreading or reflexed in anthesis.

Petals 4-6 mm. long, calyx and hypanthium in fruit together 10-12 mm. long.

Petioles conspicuously long-hairy, petals yellow.

12. *D. oregana*

Petals 2-4 mm. long, calyx and hypanthium in fruit together 6-10 mm. long.

Petioles mostly short-hairy, petals whitish.

Petals obovate, sepals twice as long as broad.

13. *D. albida*.

Petals orbicular or nearly so; sepals half longer than broad.

14. *D. micropetala*

Style filiform or nearly so, more than twice as long as the ovary; plant about 2 dm. high.

Petals much exceeding the sepals, leaflets rhombic-obovate.

15. *D. rhomboides*.

1. *D. agrimonioides* (Pursh) Rydb. Stem stout and erect, 3-10 dm. high, striate, generally densely glandular- or viscid-hirsute; basal leaves many, leaflets 7-11, strongly veined, densely pubescent on both sides; upper three leaflets larger than the others, usually 4-5 cm. long, doubly serrate, the odd one commonly rhomboid, the others usually obliquely ovate, flowers 12-18 mm. in diameter; bractlets lanceolate, much smaller than the oblong-ovate, acute or mucronate sepals. *Potentilla arguta* Pursh. Meadows and rocky places: N B —D.C.—Colo.—Mack. Plain—Submont. Je—Au.

2. *D. corymbosa* Rydb. Stem 3-8 dm. high, branched above; basal leaves pinnate, with 7-11 leaflets; upper leaflets broadly obovate, 3-5 cm. long, usually rounded at the apex, sparingly short-hairy, coarsely and deeply doubly serrate, with ovate teeth; lower leaflets more orbicular, sepals ovate-lanceolate, acute, 5 mm. long. Meadows: Alta.—B.C.—n Colo.—Wash. Submont.—Mont. Je—Au.

3. *D. convallaria* Rydb. Stem tall, erect, 4-10 dm. high, long-villous; basal leaves several, pinnate; leaflets 9-11, slightly long-pubescent or glabrate, the upper 3-5 cm. long, rhombic-obovate and acute, coarsely serrate and incised, the lower leaflets more ovate; flowers 10-18 mm. in diameter; petals broadly obovate, white, a little longer than the sepals; sepals ovate-lanceolate. Valleys: Mont.—N.M. Submont.—Mont. Je—Au.

4. *D. pseudorupestris* Rydb. Stem erect, slender, striate, 2-3 dm. high, or in lower meadows (var. *intermedia*) 4-5 dm. high; basal leaves several; leaflets 7-9, sparingly and finely pubescent or glabrate, the terminal one obovate to cuneate-flabelliform, the lateral ones obliquely elliptic or nearly orbicular, all coarsely serrate and incised; stem-leaves few and small, the leaflets 3-5 and more rhombic; flowers 15-20 mm. in diameter; petals broadly obovate, exceeding the sepals by a third; sepals ovate-lanceolate, pointed. Mountains: Alta.—n Wyo.—Ida. Submont.—Subalp. Je—Au.

5. *D. foliosa* Rydb. Stem stout, 4-5 dm. high; basal leaves 1-1.5 dm. long, with about 9 leaflets, the upper leaflets rhombic-obovate, 4-5 cm. long, sparingly hairy and glandular-tomiferous, coarsely and more or less doubly serrate; lower leaflets more rounded; upper stem-leaves 3-5-foliate, all with rather large and rhombic leaflets; cyme rather open and corymbiform; sepals lanceolate, acute or acuminate, 5-6 mm. long; petals yellow, rounded-obovate, about 8 mm. long. Mountains: Mont.—Wyo.—n Utah. Submont.—Mont. Je—Au.

6. *D. valida* (Greene) Piper. Stem stout, tall, 4-10 dm. high, erect; basal leaves pinnate; leaflets 7-11, more or less pubescent or glabrate, 3-6 cm. long, the terminal one broadly obovate, the lateral ones obliquely elliptic or nearly orbicular, all coarsely serrate; stem-leaves with fewer, sometimes more rhombic and acutish leaflets; flowers 18-22 mm. in diameter; sepals ovate-lanceolate, pointed; petals yellow, broadly elliptic or nearly orbicular, 8-10 mm. long. *D. glutinosa* (Nutt.) Rydb. Meadows: B.C.—Ida.—n Utah—Wash. Submont.

7. *D. fissa* (Nutt.) Rydb. Stem low, 2-3 dm., or sometimes 4 dm. high, very leafy; basal leaves with short petioles, pinnate; leaflets, as a rule, 9, nearly

orbicular, except the upper ones, which are somewhat rhombic, all deeply incised and doubly serrate; stem-leaves similar, only the upper ones slightly reduced; flowers 15-20 mm. in diameter; sepals triangular-lanceolate, long-acuminate; petals orbicular, very concave, much exceeding the sepals. Mountains: (Black Hills) S D —Alta.—Utah—Colo. *Submont.*—*Subalp.* My—Au.

8. *D. pumila* Rydb. Cespitose; stem about 1.5 dm. high, sparingly viscid-puberulent or glabrate, basal leaves 4-7 cm long, with 9-11 leaflets; terminal leaflets broadly obovate or flabelliform-cuneate, about 1 cm. long and broad, serrate above the middle; lateral leaflets broader, often broader than long; stem-leaves 1-3, the uppermost often with but 3 leaflets; inflorescence small, corymbiform; sepals 5 mm. long; petals rounded-obovate or orbicular, 7-8 mm. long, yellow. Mountains: Ore —Utah—Calif. *Mont.* Je—Au.

9. *D. glandulosa* (Lindl.) Rydb. Stem strict, 3-6 dm. high; basal leaves pinnate, sometimes interruptedly so; leaflets 7-9, sparingly hairy, obovate, obtuse, simply or doubly serrate, with broad teeth, the upper 1-3 cm. long; stem-leaves smaller, short-petioled, 3-7-foliate; flowers in an open many-flowered cyme, 10-15 mm. in diameter; sepals oblong or ovate-lanceolate; petals obovate, about equalling the sepals. Mountains: (Black Hills) S.D.—B.C.—Calif —N M. *Submont.*—*Mont.* Je—Au.

10. *D. arizonica* Rydb. Stem 3-5 dm. high, sparingly viscid-villous, often tinged with red; basal leaves 1-1.5 dm long, with about 9 leaflets; upper leaflets broadly obovate, coarsely serrate with ovate teeth, the lateral leaflets almost orbicular; lower stem-leaves similar, the upper 3-foliate; cyme rather dense, few-flowered; sepals ovate-lanceolate, acuminate, 5 mm. long, in fruit 7 mm. long; petals nearly orbicular, about equalling the sepals. Mountains: Ariz.—s Utah *Son.* Je—Jl.

11. *D. incisa* (Lindl.) Rydb. Stems 3-5 dm. high; basal leaves about 1 dm. long, with 7-9 leaflets; terminal leaflet rhombic-obovate, about 3 cm long and 2 cm. wide, sparingly pubescent or glabrate above, softly pubescent beneath; lower leaflets more obovate and smaller; upper stem-leaves reduced, 3-foliate; sepals lanceolate, acuminate, 5-6 mm. long, in fruit 8-9 mm. long; petals rounded-obovate, often pale yellow, about 6 mm long. Meadows: Wash.—Ida.—Calif. *Submont.* Je—Jl.

12. *D. oregana* (Nutt.) Rydb. Stem 6-7 dm high; basal leaves 1.5-2 dm. long, with about 9 leaflets; terminal leaflets rounded-obovate, with cuneate base, 3-4 cm. long, 2-3 cm. wide, doubly serrate, the lateral leaflets somewhat smaller and more rounded; upper leaves reduced and with 3 oblanceolate leaflets; sepals ovate, mucronate, 5-6 mm. long. Dry copses and sand bars: Mack.—B.C.—Ore.—Ida *Submont.* My—Au.

13. *D. albida* Rydb. Stems usually several; basal leaves 1-1.5 dm. long, pinnate, with usually 7 leaflets; terminal leaflets 2-4 cm. long, obovate, usually acutish, sparingly pubescent, usually doubly serrate; lateral leaflets more rounded-obovate; stem-leaves 3-5-foliate, the upper somewhat smaller; inflorescence open; sepals elliptic-ovate, mucronate, about 4-5 mm. long, usually shorter than the sepals. Copses: B.C —Wash. *Submont.* Je—Jl.

14. *D. micropetala* Rydb. Stem 4-6 dm. high, sparingly viscid-villous; basal leaves pinnate, with 5-7 leaflets; terminal leaflet obovate, with cuneate base, 2-3 cm. long, coarsely serrate; lateral leaflets smaller and more rounded; upper stem-leaves 3-5-foliate; inflorescence rather dense; sepals ovate, mucronate, about 4 mm. long; petals 2-3 mm. long. Cañons: Utah—Ida. *Submont.* Je—Jl.

15. *D. rhomboidea* Rydb. Stem low and slender, about 2 dm. high, simple, about 3-leaved; basal leaves many, short-petioled; leaflets about 7, smooth or beset with a few scattered hairs, rhombic-ovate, mostly acute, serrate, the largest leaflets 1.5 cm., seldom 2 cm. long; upper stem-leaves 3-foliate and subsessile; flowers few in open cymes, about 1 cm. in diameter; sepals 4-5 mm. long, broadly ovate, slightly mucronate; petals yellow, obovate, a little exceeding the sepals. Mountains: Ore.—Wash.—w Mont. *Submont.*

19. **CHAMAERHODOS** Bunge.

Perennial or biennial herbs, with taproots, 2-4 times ternately divided leaves, and small cymose flowers. Hypanthium cup-shaped, small. Petals and sepals 5; bractlets wanting. Petals obovate or cuneate, somewhat clawed. Stamens 5, opposite the petals; filaments subulate, short, persistent; anthers didymous, opening by a slit. Pistils 5-10, or more; styles basal, filiform. Seed inserted near the base of the style, ascending and nearly orthotropous.

1. **C. Nuttallii** Pickering. Plant 1-3 dm. high, erect, branching and leafy, hirsute and glandular, basal leaves numerous and rosulate, 2-4 ternately divided into linear or oblong divisions; inflorescence many-flowered; hypanthium 2-3 mm. in diameter, hispid; sepals narrowly lanceolate, equalling or somewhat shorter than the white obovate-cuneate petals. *C. erecta* Hook., not Bunge. Plains: Sask.—S.D.—Colo.—Alaska. *Plain—Mont.* Jl—Au.

20. **SANGUISÓRBA** L. BURNET.

Leafy perennial herbs, with thick rootstocks. Leaves odd-pinnate, with adnate stipules and toothed leaflets. Flowers perfect or some of them pistillate, in dense spikes. Hypanthium urn-shaped, contracted at the mouth, angled, and usually winged. Sepals 4, petaloid, deciduous, very concave. Petals none. Stamens in ours 4, opposite to the sepals. Pistils solitary; styles terminal; stigmas muricate-papillose; ovule solitary, suspended. Achenes dry, enclosed in the indurate 4-angled smooth hypanthium.

1. **S. sitchensis** C. A. Meyer. Stem leafy, 2-12 dm. high; leaves odd-pinnate, the lower with 11-21 leaflets; leaflets 2-7 cm. long, 1.5-5 cm. wide, coarsely serrate, rounded at the apex, those of the lower leaves deeply cordate at the base; spike 2-10 cm. long, in age cylindric; sepals oval, 2.5-3 cm. long, white or slightly tinged with purple. *S. canadensis latifolia* Hook. Moist places: Alaska—Yukon—Ida—Wash. *Submont.* Jl—Au.

21. **POTERÍDIUM** Spach.

Leafy branched annuals or biennials, with taproots. Leaves odd-pinnate, with adnate stipules and pectinately pinnatifid leaflets. Flowers greenish, perfect, in dense, oblong spikes. Hypanthium urn-shaped, contracted at the mouth, 4-winged. Sepals 4, green, with white-scarious margins. Stamens 2 or 4, opposite to all or the inner two sepals; filaments short. Pistils solitary; styles terminal; stigmas brush-like. Ovules solitary, suspended. Achenes enclosed in the 4-winged, indurate, dry hypanthium.

1. **P. occidentale** (Nutt.) Rydb. Stem branched, leafy, 2-10 dm. high; leaves glabrous, odd-pinnate; leaflets of the lower leaves 11-15, obovate, the larger 1-2 cm. long, pectinately pinnatifid into 9-15 narrowly linear acute divisions; spikes globose to oblong-cylindric, 0.5-2.5 cm., or in fruit even 3-4 cm. long, 7-8 mm. thick; sepals oval, white-margined, green in the middle, 2 mm. long; stamens 2, opposite the inner sepals; fruiting hypanthium lance-ovoid, 4-angled, with narrow, thick wings, reticulate on the faces. *Poterium annuum* Hook., not Nutt. *Sanguisorba occidentalis* Nutt. Moist places: Wash.—Mont.—Ida.—Calif. *Submont.* Je—Au.

22. **AGRIMÓNIA** L. AGRIMONY.

Perennial herbs, with rootstocks. Leaves odd-pinnate, with smaller leaflets interposed between the larger ones. Flowers in narrow racemes, regular, perfect. Hypanthium hemispheric to obconic, constricted at the throat and enclosing the achenes in fruit, usually 10-grooved longitudinally, above with a ring of hooked bristles. Sepals 5, after anthesis more or less connivent, forming a nipple-shaped beak on the fruit. Petals 5, small, yellow, clawless. Stamens 5-15; filaments slender. Pistils 2; styles terminal; stigmas 2-lobed; ovules suspended.

Fruiting hypanthium with several series of bristles, the lower bristles reflexed; sepals acuminate with tips incurved in fruit. 1. *A. gryposepala*.
Fruiting hypanthium with 2-4 series of bristles, the latter erect, ascending or merely spreading; sepals acute. 2. *A. striata*.

1. **A. gryposepala** Wallr. A perennial, with short thick rootstocks; stem 3-18 dm. high, sparingly hirsute and glandular-granuliferous; principal leaflets 5-9, oval or obovate, or those of the upper leaves narrower, coarsely serrate, acute, glabrous or sparingly strigose above, hirsute and glandular-granuliferous beneath, 4-12 cm. long; petals 2.5-3 mm. long, bright yellow; fruiting hypanthium 4-5 mm. long, abruptly contracted at the base, strigose, strongly grooved. *A. hirsuta* Bickn. Thickets: N.S.—N.D.—N.M.—S.C.; Calif.; Mex. *Plain*—*Submont.* Je—Au.

2. **A. striata** Michx. A perennial, with stout rootstock and fibrous roots; stem 3-20 dm. high, hirsute and glandular-papillose; principal leaflets 7-13, hispidulous or scabrous above, copiously glandular-granuliferous and somewhat pubescent beneath, lanceolate, elliptic, or oblanceolate, or rhombic-obovate, acuminate, sharply serrate, 3-10 cm. long; petals deep yellow, obovate, 3 mm. long; fruiting hypanthium 5 mm. long, turbinate, strongly ribbed, glandular-granuliferous. *A. Brittoniana* Bickn. Roadsides and copses: N.S.—B.C.—N.M.—W.Va. *Plain*—*Submont.* Jl—Au.

23. COLEÓGYNE Torr. BLACK BUSH.

Shrubs, with linear-clavate, entire, opposite, crowded leaves and opposite spinose branches; leaf-blades deciduous. Flowers solitary, terminating short branches. Calyx coriaceous, yellowish or brownish; sepals 4, connate at the base, persistent. Corolla wanting. Stamens 30-40; filaments slender, distinct, except at the very base, there slightly adnate to a tubular sheath-like prolongation of the disk, separating the stamens from the pistil. Gynoecium of a single pistil; ovary 1-ovuled, 1-celled; style lateral, filiform, bent and twisted, very villous, exserted, stigmatose on one side; ovules hemitropous. Fruit an achene.

1. **C. ramosissima** Torr. A shrub, 1-2 m. high, with divergent opposite branches, with at first ashy, in age black bark; leaves clavate, strigose, 5-15 mm. long, flat above, 4-grooved beneath; sepals yellowish or brownish, 7-8 mm. long, the outer lanceolate, acute, the inner ovate or obovate, acuminate; tubular sheath 4-5 mm. long; style villous. Desert mesas and foothills: sw Colo.—s Calif.—Ariz. *Son.* Ap—My.

24. WALDSTEINIA Willd. BARREN STRAWBERRY.

Herbs, with perennial rootstocks and membranous stipules. Leaves basal, palmately 3-5-foliolate or 3-7-lobed. Stem in our species scapiform. Hypanthium mostly obconic. Sepals 5, valvate, spreading. Petals 5, yellow, obovate. Stamens numerous, filaments subulate, flattened below. Pistils 1-6, inserted on a short villous receptacle; styles filiform, terminal, deciduous. Achenes obliquely ovoid, pubescent. Seeds erect.

1. **W. idahoensis** Piper. Leaf-blades orbicular, slightly 5-7-lobed, cordate at the base, coarsely and doubly crenate-dentate, sparsely hirsute above and on the margin, 2-5 cm. broad; scapes 1-2.5 dm. long, glabrous or nearly so; inflorescence glandular-puberulent, 2-7-flowered; hypanthium obconic, 4 mm. long; sepals triangular-lanceolate, acute, 5-6 mm. long; petals yellow, orbicular, equalling the sepals. Mountains: Ida. *Submont.* Jl.

25. DRYAS L. DRYAD, MOUNTAIN AVENS.

Low depressed undershrubs, strongly caespitose, with short horizontal branches. Leaves alternate, petioled, simple, crenate or entire, white-tomentose beneath. Flowers solitary on naked peduncles. Hypanthium saucer-shaped, little developed. Bractlets wanting. Sepals 8-10, persistent. Petals 8-10, obovate or oval. Stamens numerous, inserted in the mouth of the hypanthium; filaments subulate. Pistils numerous, sessile; style terminal, persistent, elongate and plumose in fruit. Fruit indehiscent, 1-seeded. Seeds basal, ascending.

Sepals linear or linear-lanceolate; petals white, spreading.

Leaf-blades entire or with a few acutish teeth, shining and not conspicuously rugose above, broadest near the base 1. *D. integrifolia*.

Leaf-blades coarsely round-crenate, dull, strongly rugose and impressed-reticulate above, broadest near the middle. 2. *D. octopetala*.

Sepals ovate or ovate-lanceolate; petals yellow, strongly ascending.

Hypanthium and calyx densely hairy with black glandular hairs, only slightly tomentose. 3 *D. Drummondii*.

Hypanthium and calyx densely white-tomentose, not glandular. 4 *D. tomentosa*.

1. ***D. integrifolia*** Vahl. Leaf-blades lanceolate or elliptic-lanceolate, rounded, truncate, or subcordate at the base, acutish at the apex, 6-25 mm. long, usually with entire revolute margins, densely white-tomentose beneath, glabrate and shining above; scapes 5-15 cm. long, tomentose; hypanthium and calyx tomentose and usually more or less densely black- or brown-hairy; sepals linear or linear-lanceolate, 5 mm. long; petals white, elliptic, 8-12 mm. long. Ridges: Greenl.—Lab.—N.H.—B.C.—Alaska. *Alp.* Je-Jl.

2. ***D. octopetala*** L. Leaf-blades oblong, elliptic or oval, white-tomentose beneath, glabrate and dull above, 6-25 mm. long, rounded or obtuse at both ends, or subcordate at the base; scape 5-20 cm. long, tomentose and more or less black-hairy; hypanthium black-hairy and tomentose; petals white, elliptic or obovate-elliptic, 1-1.5 cm. long. Ridges: Greenl.—Colo.—Wash.—Alaska; alpine and arctic Eurasia. *Alp.—Subalp.* Je-Au.

3. ***D. Drummondii*** Richards. Leaf-blades elliptic or obovate, 1-3 cm. long, white-tomentose beneath, dark green, dull, slightly tomentose or glabrous above, veiny and somewhat rugose, coarsely crenate, acute at the base and rounded at the apex; scape 5-20 cm. long, tomentose and somewhat black-hairy above; petals yellow, about 1 cm. long, elliptic-spatulate or obovate. Ridges: Que.—Mont.—Ore.—B.C.—Mack. *Alp.—Subalp.* Je-Au.

4. ***D. tomentosa*** Farr. Leaf-blades obovate or elliptic, 1-2 cm. long, coarsely crenate, acute at the base, rounded at the apex, tomentose on both sides, grayish-green above, white beneath; scape 5-10 cm. long, densely white-tomentose; sepals ovate, 5 mm. long; petals yellow, spatulate, 8 mm. long. Ridges: Alta.—B.C. *Subalp.* Jl.

26. *GEUM* L. AVENS.

Perennial herbs, with rootstocks. Basal leaves lyrate odd-pinnate, with large terminal divisions; stem-leaves few, reduced, most often 3-fid or the upper bract-like. Stipules persistent, adnate to the clasping bases of the petioles. Flowers cymosely corymbos. Hypanthium turbinate, hemispheric, or saucer-shaped. Bractlets 5, sometimes reduced. Sepals 5, imbricate or valvate. Petals 5, orbicular, obovate, or cuneate, yellow, white, or red. Stamens numerous, in several series; filaments free, filiform. Pistils numerous, inserted on a clavate receptacle; styles filiform, terminal, strongly curved and geniculate above, the upper portion deciduous. Achenes small, dry, with a hooked beak. Seed erect.

Sepals reflexed, upper internode of the style less than one-third as long as the lower

Petals white or ochroleucous, receptacle long-hairy, hairs at least half as long as the achenes. 1 *G. canadense*

Petals bright or golden yellow; receptacle short-hairy.

Leaflets of the stem-leaves decurrent on the rachis, the upper ones confluent 2 *G. decurrens*.

Leaflets of the stem-leaves not decurrent

Upper internode of the style hirsute, the hairs about 1 mm. long, lower internode hirsute below, not glandular; petals orbicular, rounded at the base 3 *G. strictum*

Upper internode of the style short-hispidulous at the base or glabrous, petals usually cuneate at the base, except in *G. perincisum*, lower internode of the style glandular-puberulent

Divisions of the upper stem-leaves ample, rhombic or cuneate; inflorescence corymbiform, usually with short branches 4 *G. macrophyllum*

Divisions of the upper small stem-leaves oblanceolate or rarely obovate, inflorescence open, with slender branches

Leaflets doubly serrate or dentate, terminal leaflet of the basal leaves rounded or reniform. 5 *G. oregonense*

Leaflets especially those of the upper leaves deeply incised, terminal leaflet of the basal leaves rhombic, ovate, or subcordate

6 *G. perincisum*.

Sepals ascending or merely spreading, upper internode of the style at least half as long as lower internode, hirsute, petals flesh-colored, purple-veined. 7 *G. rivale*.

1. ***G. canadense*** Jacq. Stems 3-10 dm. high, finely pubescent or glabrate; blades of the earlier basal leaves reniform or rounded-cordate, round-lobed and

G. rivale × **strictum**. With the habit of *G. strictum*, but differing in the petals, which are golden-yellow, obcordate, clawed at the base and emarginate at the apex, longer than the reflexed sepals; the basal leaves are those of *G. rivale*. *G. aurantiacum*, Fries. B C.—Alta.—n N.Y.

27. **SIEVERSIA** Willd. OLD MAN'S WHISKERS.

Perennial herbs, with rootstocks or suffruticose bases. Basal leaves usually numerous, lyrate or odd-pinnately divided, usually with smaller segments interposed between the larger ones; stem-leaves usually reduced; stipules usually large, adnate to the petioles. Flowers solitary or corymbose-cymose. Hypanthium turbinate or hemispheric. Bractlets usually present. Sepals 5, valvate. Petals 5, white, light yellow, pinkish, or purplish. Stamens many, inserted on a disk in the mouth of the hypanthium. Pistils numerous, inserted on a short carpophore. Styles not articulate or obsoletely so, the lower portion plumose, elongate in fruit, not at all hooked or rarely slightly so, the upper portion glabrous, persistent or withering and then deciduous, but not falling off early at a distinct node. Fruit a hairy achene. Seed erect, basal. [*Erythrocoma* Greene.]

Leaflets cuneate, toothed at the apex.

Hypanthium at least in flower acute at the base; bractlets much exceeding the lanceolate sepals; petals elliptic 1. *S. triflora*

Hypanthium in flower rounded or sunken at the base; bractlets about equalling or shorter than the ovate or ovate-lanceolate sepals, petals broadly elliptic

Bractlets linear or linear-subulate, equalling the sepals or slightly exceeding them 2. *S. grisea*

Bractlets oblong-linear or lanceolate, shorter than the sepals 3. *S. canescens*

Leaflets dissected at least half way into linear or linear-lanceolate divisions

Bractlets longer than the sepals, hypanthium and sepals usually strongly purple-tinged. 4. *S. ciliata*

Bractlets shorter than the sepals, hypanthium and sepals yellowish and only slightly purple-tinged

Leaflets, except in depauperate specimens, 2-4 cm. long, ascending, scarcely glandular 5. *S. flavula*

Leaflets less than 1.5 cm. long, spreading, conspicuously glandular-pruinose and hirsute 6. *S. brevifolia*.

1. ***S. triflora*** (Pursh) R. Br. Stem finely pilose and somewhat hirsute, 2-4 dm. high, cymosely 3-flowered; basal leaves 1-2 dm. long; principal leaflets 7-15, at the apex 2- or 3-cleft less than half their length, finely puberulent; hypanthium densely pilose, more or less turbinate at the base; bractlets linear-subulate, 12-18 mm. long; sepals lanceolate; petals yellowish or flesh-colored. *Geum triflorum* Pursh. *Erythrocoma triflora*, *E. cinerascens*, and *E. affinis* Greene. Hills: Newf.—N.Y.—Ill.—Neb.—Mont.—Alta. Plain—Submont. My-Jl.

2. ***S. grisea*** (Greene) Rydb. Stem 2-3 dm. high, purple-tinged, pilose throughout; basal leaves 5-15 cm. long; principal leaflets cuneate or obovate-cuneate, 1-2 cm. long, pilose on both sides, yellowish green, usually 3-cleft to near the middle and again toothed; bractlets linear-subulate, about 1 cm. long, hypanthium hemispheric or slightly sunken at the base, tinged with scarlet or rose; sepals triangular-lanceolate or lance-ovate, petals elliptic or oblong-spatulate, about equalling the bractlets. *Erythrocoma grisea*, *E. arizonica*, *E. tridentata*, and *E. aliena* Greene. Mountains: Mont.—Wash.—Ore.—N.M.; Chihuahua. Submont.—Mont. My-Jl.

3. ***S. canescens*** (Greene) Rydb. Stem 2-4 dm. high, finely pilose throughout, usually 3-flowered; basal leaves 8-15 cm. long; leaflets obovate-cuneate, 1-2.5 cm. long, densely pilose and ciliate on the margins and veins, 2-3-cleft and toothed or sometimes merely 3-5-toothed at the apex; bractlets oblong-linear or lanceolate, 6-8 mm. long; hypanthium hemispheric or sunken at the base; sepals broadly ovate-lanceolate or ovate, acute; petals elliptic or elliptic-obovate, slightly exceeding the sepals. Scarcely distinct from the preceding. *E. canescens* Greene. Mountains: Wash.—Ida.—Calif. Submont.

4. ***S. ciliata*** (Pursh) G. Don. Stem 2-5 dm. high, finely pilose and silky-hirsute, cymosely 3-15-flowered; basal leaves 1-2 dm. long; principal leaflets 9-19, obovate in outline, finely pilose-puberulent, and more or less densely silky-ciliate on the veins and margins; bractlets linear-subulate; sepals finely pilose, ovate-lanceolate; petals broadly elliptic or oval, flesh-colored or yellowish

Geum ciliatum Pursh. *Erythrocoma dissecta*, and *E. ciliata* Greene. Mountains and hills: Alta.—N.M.—Utah—Wash.—B.C. *Submont.*—*Subalp.* My—Au.

S. ciliata × **grisea**. Intermediate between the two species. *E. australis* Greene.

5. S. flavula (Greene) Rydb. Stem 2–3 dm. high, rather slender, yellowish, only slightly tinged with red, finely pilose; basal leaves 5–15 cm. long; principal leaflets cuneate or rhombic-cuneate, finely puberulent, and ciliate on the margins and veins, yellowish green; hypanthium low, hemispheric; bractlets linear-subulate; sepals deltoid-lanceolate, yellow, merely purple-veined; petals yellow, oval, barely exceeding the sepals. Scarcely distinct from *S. ciliata*. *E. flavula* Greene. Mountains: Wyo.—Mont. *Mont.* My—Au.

6. S. brevifolia (Greene) Rydb. Stem 1–2 dm. high, with few reduced leaves, pilose; basal leaves numerous, short, 4–8 cm. long; principal leaflets cuneate in outline, about 1 cm. long, hirsute and glandular-pruinose; hypanthium hemispheric; bractlets linear; sepals elliptic or lance-elliptic, purple-veined; petals yellow, elliptic or oval. Closely related to *S. ciliata*. *E. brevifolia* Greene. Mountains: c Utah. *Submont.*—*Mont.* Je—Jl.

28. ACOMASTYLIS Greene.

Low caespitose perennials, with strong rootstocks. Basal leaves numerous, pinnately divided, with numerous cleft or toothed divisions; stem-leaves few, reduced and with few divisions. Flowers terminal, solitary or in 2–4-flowered cymes. Hypanthium more or less turbinate. Bractlets and sepals 5. Petals 5, obovate, oval, or suborbicular, yellow. Stamens numerous, inserted in the mouth of the hypanthium. Pistils numerous; ovaries hirsute, lanceolate, tapering into the glabrous, persistent styles, which do not elongate in fruit; ovules basal.

Leaves densely silky-canescens.

Leaves puberulent, somewhat glandular-granuliferous or glabrate, not silky.

1. *A. sericea*.

2. *A. turbinata*.

1. A. sericea Greene. Stem 1–3 dm. high, slender, silky; basal leaves 5–10 cm. long, densely silky-villous; segments 15–25, cuneate in outline; stem-leaves 1–3; hypanthium short-turbinate, 4–5 mm. high and broad; bractlets lanceolate; sepals triangular-ovate; petals yellow, orbicular, 8–10 mm. long. *Geum sericeum* Greene. *Sieversia sericea* Greene. Mountains: Nev.—Ida.—Wyo.—Mont.

2. A. turbinata (Rydb.) Greene. Stem slender, 0.5–3 dm. high, silky-strigose or glabrate; basal leaves 5–15 cm. long; segments 11–33, oblanceolate, obovate, or cuneate in outline, with lanceolate or oblong lobes; stem-leaves 1–3; hypanthium obconic-turbinate, about 5 mm. high and broad; bractlets lanceolate; sepals ovate, short-acuminate; petals yellow, broadly obovate or obovate, 6–8 mm. long. *Potentilla nivalis* Torr. *Geum turbinatum* Rydb. *Sieversia turbinata* Greene. *S. scapoidea* A. Nels. *A. arapahoensis* Daniels. Mountains: Mont.—N.M.—Ariz.—Nev. *Mont.*—*Alp.* Je—Au.

29. FALLÜGIA Endl. APACHE PLUME.

Low shrub, with straw-colored branches and flaky bark. Leaves pinnately dissected into linear divisions, revolute on the margins, and with small stipules. Flowers solitary or few at the ends of the branches, peduncled. Hypanthium hemispheric, persistent, villous within. Sepals 5, imbricate. Bractlets present. Petals 5, white, rounded, spreading. Stamens numerous, inserted on the margin of the hypanthium in three series. Pistils numerous, villous, on a conic receptacle; style terminal; ovules solitary, erect, basal. Fruit of coriaceous, villous, oblong achenes, with (in fruit) elongate, plumose, persistent styles.

1. F. paradoxa (D. Don) Endl. A shrub 5–10 dm. high, much branched; bark white, in age somewhat shreddy; leaves pinnatifid, with 3–7 linear, revolute divisions, puberulent, villous or in age glabrate, rusty-lepidote beneath, 1–2 cm. long; flowers few, in corymbiform cymes; hypanthium hemispheric, 4–5 mm. high, silky-villous; sepals 8–10 mm. long, often rose-tinged, villous; outer ones lanceolate or ovate, long-acuminate-caudate, 3-cleft at the apex, or entire; petals

obovate to elliptic, 1.5–2 cm. long, obtuse; pistils numerous; styles in fruit 3–4 cm. long. Hills and cañons: Tex.—Colo.—Utah—Ariz.; n Mex. *Son.*—*Mont.* Ap—Au.

30. *COWANIA* D. Don. CLIFF ROSE.

Shrubs or small trees. Leaves alternate, toothed or pinnatifid, or entire, coriaceous, glandular-dotted, mostly with revolute margins and tomentulose beneath. Flowers solitary, terminal, on short branches. Hypanthium wholly persistent, more or less turbinate. Sepals 5, imbricate, persistent. Petals 5, obovate, spreading. Stamens numerous in two series, inserted in the throat of the hypanthium. Pistils 4–12, or in one species only 1–3, distinct, sessile, densely villous-hirsute; style terminal, plumose, persistent, elongate in fruit, ovules solitary.

1. *C. Stansburiana* Torr. A shrub 1–3.5 m. high; bark of the stem gray and shreddy, that of the young branchlets reddish-brown and glandular; leaves obovate in outline, 8–15 mm. long, glandular-punctate and green above, more or less tomentulose beneath, revolute-margined, pinnately 3–5-divided; flowers solitary, terminal; hypanthium turbinate-funnelform; petals sulphur-yellow or cream-colored, broadly obovate, 8–10 mm. long. *C. mexicana* A. Gray, not D. Don. Dry hills: N.M.—s Colo.—Nev.—s Calif.; n Mex. *Son.*—*Submont* My—N.

31. *PURSHIA* DC.

Shrubs, with spreading branches. Leaves alternate, crowded, apparently fasciated, deeply 3-cleft, with revolute margins. Flowers solitary, terminating short branches. Hypanthium turbinate or funnelform, persistent. Sepals 5, imbricate. Petals 5, yellow. Stamens about 25, in one series, inserted on the margin of the hypanthium. Pistils 1, rarely 2, lance-oblong, tapering into a short persistent style, which does not greatly elongate in fruit; ovule solitary, basal, erect. [*Kunzia* Spreng]

1. *P. tridentata* (Pursh) DC. Shrub 1–3 m. high; bark chestnut-brown or grayish; leaves cuneate in outline, 5–30 mm. long, 3-lobed at the apex, white-tomentose and revolute-margined beneath, glabrate or slightly tomentose above when young; flowers solitary; hypanthium funnelform; sepals oblong or elliptic; petals spatulate-obovate, 7–9 mm. long. Hills: Mont.—N.M.—Calif.—B C. *Son.*—*Submont.* My—Au.

32. *CERCOCARPUS* H.B.K. MOUNTAIN MAHOGANY.

Shrubs or trees with hard wood. Leaves alternate, simple, toothed or entire-margined. Flowers axillary, solitary or fasciculate. Hypanthium with a cylindric persistent tube, abruptly widening into a turbinate or campanulate, deciduous limb. Sepals 5, from broadly triangular to nearly subulate. Corolla wanting. Stamens 15 or more, inserted at different heights on the limb of the hypanthium. Pistil solitary, inserted in the bottom of the hypanthium, ovary cylindric-fusiform, sessile; style terminal, elongate, plumose; stigma undivided, terminal. Seed cylindric, solitary, basal.

Leaves serrate or dentate

Hypanthium and leaves villous, with spreading hairs; leaves broadly obovate, 1.5–3 cm. long. 1. *C. montanus*

Hypanthium and leaves appressed-silky

Leaves obovate-flabelliform, 1–2 cm. long. 2. *C. flabellifolius*

Leaves oblanceolate or obovate, 2–4 cm. long. 3. *C. argenteus*

Leaves entire, from linear to elliptic, coriaceous, with more or less revolute margins, resinous.

Leaf-blades 1.5–3 cm. long, tail of fruit 4–6 cm. long

Leaf-blades elliptic, only slightly revolute, in age merely tomentulose beneath. petioles 3–5 mm. long. 4. *C. ledifolius*.

Leaf-blades linear, strongly revolute, permanently white villous-tomentose beneath, petioles 1–2 mm. long. 5. *C. hypoleucus*

Leaf-blades 5–15 mm. long, narrowly linear, strongly revolute, only the midrib of the lower surface exposed, tail of fruit 3–4 cm. long.

Leaves short-villous when young.

Leaves glabrous from the beginning. 6. *C. arizonicus*

7. *C. intricatus*

1. *C. montanus* Raf. Shrub 1-2 m. (rarely 3 m.) high; leaf-blades 2-5 cm. long, coarsely serrate, with ovate teeth, pale and finely tomentose beneath; tube of the hypanthium about 1 cm. long, pilose; limb campanulate or somewhat turbinate, together with the sepals 6-7 mm wide. *C. parvifolius* Nutt. Hills and mountain sides: S.D.—w Kans.—N.M.—Utah—Mont. Plain—Mont. My-Jl.

2. *C. flabellifolius* Rydb. Low shrub, with gray smooth flaky bark; leaf-blades 1-2 cm. long and nearly as broad, coarsely dentate above the middle, pale beneath; tube of the hypanthium silky-strigose; limb campanulate, puberulent within, together with the sepals 5 mm. wide. Hills and cañons: Utah—N.M.

3. *C. argenteus* Rydb. Shrub 2-3 m. high, with gray bark; leaf-blades oblanceolate or obovate, 2-4 cm. long, obtuse or rarely rounded at the apex, crenate above and at the middle, silvery-white beneath; teeth rounded-ovate, obtuse; tube of the hypanthium 8-10 mm. long, silky; limb silky without, turbinate, together with the sepals 6-7 mm wide. Hills: Colo.—Tex.—N.M. Son.—Submont. Je-Jl.

4. *C. ledifolius* Nutt. Aromatic tree, sometimes 12 m. high, with red-brown, furrowed bark; leaf-blades narrowly lanceolate, lance-elliptic, or oblanceolate, entire, with revolute margins, villous-puberulent when young, glabrate in age above, pale or rufous, and tomentulose beneath, 1-3 cm. long, 5-10 cm. broad, persistent, tube of the hypanthium 5-7 mm long, white-villous-tomentose; limb turbinate, together with the ovate sepals 5-6 mm. wide. Hills: Mont.—Colo.—s Calif.—Wash. Submont.—Mont. My-Jl.

5. *C. hypoleucus* Rydb. Shrub or small tree, 1-5 m. high, with ashy bark; leaf-blades linear-lanceolate or linear-elliptic, acute at both ends, 1-2 cm. long, 3-4 mm. wide, green above, at first villous, in age glabrate, densely white-villous-tomentose beneath; tube of the hypanthium 4-5 mm., in fruit 5-6 mm. long, white-villous; limb turbinate, together with the sepals 4 mm. broad. Hills: Mont.—Wyo.—Ore. Son.—Submont. Je-Jl.

6. *C. arizonicus* M. E. Jones. Intricately branched, spinose shrub, with ashy bark; young branches white villous-tomentose; leaves linear, 5-15 mm. long, strongly revolute, villous-canescens on both sides, glabrate above, entire, acute at both ends; flowers solitary; tube of the hypanthium in fruit 6 mm. long, short-villous, achenes 6 mm. long. Cañons. c Utah—Ariz.—Nev.

C. arizonicus × *ledifolius*. Most resembling *C. arizonicus* in habit, but the leaves broader and less revolute, 1-1.5 cm. long and 2-3 mm. wide. Utah.

7. *C. intricatus* S. Wats. Intricately branched shrub, with fissured ashy bark, more or less spinescent; young branches strigose, soon glabrous; leaf-blades linear, entire, strongly revolute on the margins; tube of the hypanthium strigose, 4 mm. long, in fruit 6 mm. long, limb turbinate, together with the sepals 3 mm. wide; achenes about 7 mm long, hirsute. Cañons and hills: Utah—Nev—Ariz.

33. RUBÄCER Rydb. FLOWERING RASPBERRY, THIMBLEBERRY, SALMON BERRY.

Unarmed shrubs, with more or less shreddy bark, more or less glandular-hispid above. Leaves petioled, simple, digitately ribbed and lobed, with acute or acuminate lobes and cordate at the base, resembling the leaves of certain maples. Flowers showy, in small panicles. Sepals 5, ovate, with long slender acuminate tips. Petals 5, pink or white. Stamens numerous, in several series; filaments slender. Pistils numerous; styles glabrous, club-shaped; stigmas slightly 2-lobed. Drupelets numerous, coherent with each other and separating from the flat receptacle, capped with a dry, rather hard, finely and densely pubescent cushion, the style inserted under its margin.

1. *R. parviflorum* (Nutt.) Rydb. Stem erect, shrubby, 5-20 dm. high, with flaky bark; leaf-blades reniform in outline, 5-20 cm. broad, 3-5-lobed, the lobes triangular; sepals broadly ovate, abruptly caudate-acuminate, about 1.5 cm. long, densely glandular on the back; petals white, broadly oval, or ovate,

15-30 mm. long; fruit convex, red, 15-20 mm. wide. *Rubus parviflorus* Nutt. *Rubus nutkanus* Moe. *Bossekia parviflora* Greene. Open woods and among bushes: Mich.—w Ont.—S.D.—N.M.—Calif.—s Alaska; n Mex. *Submont.*—*Mont.* My-Jl.

34. OREOBATUS Rydb.

Prostrate or reclining or erect shrubs, with light-colored shreddy bark. Leaves petioled, simple, maple- or gooseberry-like, digitately ribbed or lobed. Flowers showy, usually solitary. Sepals 5, ovate or ovate-lanceolate, acuminate or with foliaceous tips, in fruit erect. Petals white, pink, or purple, broadly obovate. Stamens very numerous, in several series, hiding the rather few pistils. Receptacle flat or nearly so. Styles club-shaped, densely pubescent, curved; stigma somewhat 2-lobed. Drupelets rather few, fleshy, without hairy cushions.

1. O. deliciosus (Torr.) Rydb. Stems mostly decumbent or prostrate, or ascending; young branches almost velvety; leaf-blades reniform in outline, more or less distinctly 3-7-lobed, 2-6 cm. broad; lobes very broad and rounded, dentate; flowers mostly solitary; sepals 10-15 mm. long, acuminate or with foliaceous tips; petals oval, white, 1.5-3 cm. long; fruit hemispheric, dark purple, 10-15 mm. broad. *Rubus deliciosus* Torr. *Bossekia deliciosa* A. Nels. Mountains: Colo. *Submont.*—*Mont.* Je-S.

35. RÛBUS (Tourn.) L. RASPBERRY, BLACKBERRY, CLOUDBERRY.

Perennial plants, ours either shrubs with biennial, prickly or bristly stems, or herbaceous plants, with rootstocks or creeping stems, unarmed. Leaves alternate, usually pinnately or pedately compound or rarely simple. Flowers racemose, paniculate or rarely solitary, perfect, dioecious or polygamo-dioecious. Hypanthium flat or saucer-shaped. Sepals 5, rarely 6-8, without bractlets. Petals as many, deciduous. Stamens numerous, inserted on a disk at the margin of the hypanthium. Pistils many, inserted on a convex or nipple-shaped, dry or fleshy receptacle. Fruit of several or many fleshy drupelets. Ovules 2, collateral, one abortive.

Stem herbaceous, never prickly, rarely bristly; floral branches directly from the rootstock or from stolons, stipules broad, free or nearly so.

Petals spreading or ascending, filaments not dilated

Plants dioecious, drupelets many, coherent; petals large and broad; leaves merely lobed 1 *R. Chamaemorus*

Plants with perfect flowers, drupelets few, distinct; petals narrow, leaves pedately 5-foliate 2. *R. pedatus*.

Petals erect, filaments dilated

Petals pink or rose-color, plants not stoloniferous; floral branches directly from the rootstock.

Petals oblanceolate or obovate, 10-15 mm. long, distinctly clawed; stem less than 1 dm. high, usually 1-flowered; leaflets rounded at the apex 3 *R. acaulis*.

Petals broadly obovate, rounded or emarginate, scarcely clawed, 10 mm. long or less, stem leafy, 1-3 dm. high, 1-5-flowered, stem-leaves with rhombic acute leaflets 4 *R. arcticus*.

Petals white, plant stoloniferous

Plant wholly unarmed; flowers solitary or racemose. 5 *R. pubescens*

Plant sparingly glandular-hispid above and sometimes with a few weak bristles, flowers corymbose. 6 *R. transmontanus*

Stem more or less woody, biennial or perennial, usually prickly or bristly. If unarmed or merely bristly, then the stipules narrow and more or less adnate

Stipules broad, free or nearly so; stem decumbent, prickly. 7 *R. nivalis*.

Stipules narrow, linear-lanceolate or subulate, adnate to the petioles

Carpels united into a thimble-shaped aggregate fruit, separating from the dry receptacle

Flowers solitary or few, petals purplish, large, much exceeding the sepals, leaves green on both sides 8 *R. spectabilis*.

Flowers clustered; petals white, usually shorter than the sepals, leaves more or less tomentose or at least glaucous beneath.

Inflorescence corymbiform; fruit black or purple; stem prickly, leaves, when having more than 3 leaflets, pedately compound.

Prickles of the inflorescence not flattened, straightish; leaflets dark green above, acuminate, with small teeth; stem usually dark bluish, with a bloom. 9 *R. occidentalis*.

Prickles of the inflorescence strongly flattened and curved; leaflets yellowish green above, acute, with coarse teeth; branches usually straw-colored. 10. *R. leucodermis*.

Inflorescence racemose; fruit red; leaves, when having more than 3 leaflets, pinnately compound

Plant not at all glandular-hispid; inflorescence with weak prickles, villous. 11 *R. melanotrachys*.

Plant more or less glandular-hispid, especially in the inflorescence.

Sepals narrowly lanceolate, gradually acuminate; leaves glabrate beneath in age.

Stem sparingly bristly; leaflets neither strongly plicate nor strongly veined. 12 *R. peramoenus*.

Stem densely bristly, leaves strongly plicate and strongly veined. 13 *R. viburnifolius*.

Sepals ovate or ovate-lanceolate, abruptly acuminate

Young stems, petioles, and inflorescence neither densely tomentose nor puberulent. 14 *R. melanolasius*.

Young stems, petioles and inflorescence densely tomentose or puberulent. 15 *R. acalypheus*.

Carpels coherent to the fleshy receptacle; plant dioecious with decumbent stems — and 1-3-foliate green leaves. 16 *R. macropetalus*.

1. *R. Chamaemorus* L. A herbaceous perennial, with creeping rootstock; stem 1-3 dm. high, 1-3-leaved; leaf-blades reniform, with 3-7 rounded lobes, palmately veined; flowers solitary; petals white, obovate, 8-12 mm. long; stamens numerous, in the pistillate flowers without anthers; fruit at first red, when ripe yellow or golden. CLOUD-BERRY. BAKED-APPLE BERRY. Arctic and subarctic sphagnum swamps: Greenl.—N.H.—B.C.—Alaska; Eurasia. Boreal. J1-Au.

2. *R. pedatus* Smith. An unarmed herbaceous perennial, with flagelliform creeping branches; flowering branches very short, 2-4-leaved; leaflets thin, irregularly incised, obovate, or rhombic, 1-5 cm. long; flowers solitary; petals white, obovate-oblong, spreading or reflexed; stamens many; pistils 1-6; fruit purple; drupelets short-stipitate. Woods: n Calif.—Ida.—Alta.—Yukon—Alaska. Boreal—Mont. Je-S.

3. *R. acaulis* Michx. An unarmed herbaceous, subdioecious perennial, with creeping rootstock; stem 3-12 cm. high, 2-4-leaved; leaflets 3, broadly obovate to flabelliform, unevenly serrate; petals rose-colored, with yellowish claws; fruit red; drupelets 20-30, coherent. Arctic and subarctic swamps and tundras: Lab.—Newf.—Minn.—Alaska. Boreal—Subalp. Je-Au.

4. *R. arcticus* L. An unarmed herbaceous perennial, with a rootstock; stem 0.5-2 dm. high, 2-6-leaved, more or less flexuose; leaflets 3, obovate to rhombic, coarsely dentate, 1.5-4 cm. long; petals rose-colored, clawless, sometimes denticulate; fruit red, globose; drupelets 20-40, coherent. Bogs: Lab.—Alta.; Eurasia. Boreal—Subalp. J1-Au.

5. *R. pubescens* Raf. An unarmed perennial, with flagelliform, procumbent shoots, 1-10 dm. long; leaves ternate, rarely quinate; leaflets 3-10 cm. long, green on both sides, sharply and doubly serrate, the lateral ones obliquely ovate, the terminal one rhomboid; petals elliptic or oblanceolate; fruit red, globose; drupelets rather few, large, slightly coherent. *R. triflorus* Richards. *R. americanus* (Pers.) Britt. Damp woods and swamps: Newf.—N.J.—Ia.—Mont.—B.C.; Colo. Boreal—Mont. My-J1.

6. *R. transmontanus* Focke. A mostly herbaceous perennial, with a creeping rootstock; shoots creeping, flagelliform, slightly bristly or glandular-hispid; leaves ternate; leaflets rhombic-ovate, 3-7 cm. long, acute at the base, acuminate at the apex, rather coarsely serrate; inflorescence 1-3-flowered; petals erect, white, oblanceolate, 4 mm. long; pistils 20-50; fruit hemispheric, red. Perhaps a hybrid of *R. pubescens* with some species of the *R. strigosus* group. Woods: B.C. Mont. My-J1.

7. *R. nivalis* Dougl. A perennial; stems more or less woody, creeping, terete, puberulent, 3-12 dm. long, sparingly armed with curved or hooked prickles; leaves simple or sometimes ternate, bluish green and shining; blades of the simple leaves 3-6 cm. long, ovate-cordate or rounded-cordate, more or less distinctly 3-lobed, dentate; lower leaflets of the ternate leaves obliquely ovate, the terminal one broadly rhombic-ovate, somewhat larger; flowers usually solitary; hypanthium short-turbinate, more or less prickly; petals white, linear-lanceolate, tapering at both ends; pistils few, not all maturing; drupelets pubescent, large, red. Mountains: (?) n Calif.—Ore.—Ida.—B.C. Mont.—Subalp. Je-J1.

8. *R. spectabilis* Pursh. Stems perennial, shrubby, 2-5 m. high, unarmed when young or with small straight prickles; leaves usually 3-foliolate; leaflets thin, incisedly double-serrate; terminal leaflet 4-10 cm. long, often deltoid- or rhombic-ovate; lateral leaflets obliquely ovate, subsessile; flowers mostly solitary; petals reddish purple or rose-colored, elliptic, 15-20 mm. long; fruit large, ovoid, 15-20 mm. long, red or yellow. SALMON-BERRY. Along streams: s Alaska—Ida.—Calif. *Submont.* Ap-Je.

9. *R. occidentalis* L. Stems biennial, 1-3 m. long, recurved, at length rooting at the tips, usually purplish or bluish; leaves of the shoots 3-foliolate, or some of them pedately 5-foliolate; median leaflet ovate to broadly cordate, sometimes more or less lobed, doubly serrate, acuminate at the apex, rounded to cordate at the base, 5-8 cm. long, white-tomentose beneath; lateral leaflets in the 5-foliolate leaves similar, but narrower; outer leaflets subsessile, often oblique and sometimes 2-lobed; floral branches green, their leaves 3-foliolate; leaflets similar, but rarely cordate at the base, corymbs few-flowered; sepals ovate-lanceolate, long-acuminate, 7-8 mm. long; petals white, elliptic, shorter than the sepals; fruit dark bluish purple, with a bloom, hemispheric. BLACK RASPBERRY, BLACK-CAP. Copses. N.B.—Que.—Ga—Colo.—Minn. *Plain—Submont.* Je-Jl.

10. *R. leucodermis* Dougl. Stems biennial, erect, 1-2 m. high, yellowish and glaucous, armed with stout, flat, recurved prickles; leaves of the shoots usually pedately 5-foliolate; terminal leaflet broadly ovate, 6-10 cm. long, acute, double-serrate, rounded or subcordate at the base; lateral leaflets similar, but narrower and merely rounded at the base; lower leaflets usually subsessile, floral branches usually with yellowish bark, their leaves 3-foliolate and leaflets smaller; corymbs usually few-flowered; pedicels tomentose, prickly, but not glandular; sepals lanceolate, long-acuminate, in fruit merely spreading; petals white, oblong or elliptic, shorter than the sepals; fruit hemispheric, dark reddish purple or nearly black, with a bloom. PURPLE RASPBERRY. Copses: B.C.—Mont.—Utah—Calif. *Submont.* Je-Jl.

***R. leucodermis* × *melanolasius*.** Resembling *R. leucodermis* in habit and in the prickly stem, but the upper part of the branches, the peduncles, pedicels, and petioles more or less glandular-hispid. B.C.—Mont.

11. *R. melanotrachys* Focke. Stems biennial, erect, 1-2 m. high, purplish, glabrous, short-bristly; leaves pinnately ternate; leaflets coarsely and somewhat doubly serrate, acuminate, green and glabrous above, densely white-tomentose beneath; inflorescence short, almost corymbiform; pedicels villous, not at all glandular, armed with purple, curved, strong bristles or weak prickles; hypanthium and calyx tinged with purple, bristly and villous, not glandular, petals white, elliptic, or spatulate, 5 mm. long; fruit red, hemispheric. Woods: Ida. Jl.

12. *R. peramoenus* (Greene) Rydb. Stems biennial, erect, 1-2 m. high, usually glabrous and shining, rather sparingly bristly; leaves of the turions pinnately 3-5-foliolate, green on both sides, only sparingly grayish-puberulent beneath when young; terminal leaflet cordate or ovate, sometimes 3-lobed, sharply and doubly serrate; lateral leaflets sessile, obliquely ovate; leaves of the floral branches usually ternate, their leaflets usually smaller and broader; racemes short, few-flowered; pedicels and hypanthium rather densely glandular-hispid and glandular-puberulent; petals white, erect, spatulate, 6 mm. long; fruit red, hemispheric, 12 mm. broad. *Batidaea peramoena* Greene. Damp woods: e Orc.—Wash.—w Mont. *Submont.* My-Jl.

13. *R. viburnifolius* (Greene) Rydb. Stems biennial, yellowish or brownish, seldom purplish, more or less densely bristly with fine bristles, about 1 m. high; leaves of the turions often 5-foliolate, those of the floral branches 3-foliolate; leaflets green on both sides or sparingly tomentulose beneath when young, incised-serrate; terminal leaflet rhombic-ovate or ovate, 4-6 cm. long, the lateral ones somewhat smaller, obliquely ovate; racemes short, few-flowered; pedicels, hypanthium, and calyx densely glandular-hispid and somewhat bristly; petals white, erect, 5-7 mm. long; fruit hemispheric, red or yellowish. *Batidaea viburni-*

folia Greene. Perhaps not distinct from the next. Woods: Alaska—Mack.—Mont.—B.C. Submont. Je—Jl.

14. *R. melanolasius* Focke. Stems biennial, erect, 0.5–1 m. high, purple, or yellow, and often glaucous, densely bristly and more or less glandular; leaves of the shoots pinnately 3–5-foliolate; leaflets ovate or lanceolate, short-acuminate or acute at the apex, usually rounded or cuneate at the base, sharply double-serrate, light green and sparingly and minutely pubescent above, finely and densely white-tomentose beneath; leaves of the floral branches similar, but always 3-foliolate; flowers in small terminal and axillary racemes; peduncles, pedicels, hypanthium, and calyx densely bristly and glandular-hispid; petals white, elliptic, 5–6 mm. long, erect; fruit red or purplish red, hemispheric, very sour. *R. strigosus* of Western reports. *B. laetissima*, *B. dactolica*, *B. unicolor*, and *B. Sandbergii* Greene. RED RASPBERRY. Mountains: B.C.—Alta.—Colo.—Utah—Ore. Submont.—Mont. Je—Jl.

15. *R. acalypheus* (Greene) Rydb. Stem biennial, erect, 0.5–1 m. high, brown or purple, in age exfoliating, tomentose or pilose as well as densely armed with strong bristles often flattened; leaves of the shoot pinnately, 3–5-foliolate; leaflets ovate or the terminal subcordate, rather prominently veined and plicate, incisedly double-toothed, abruptly acuminate, densely white-tomentose beneath, 2–4 cm. long; leaves of the floral branches always 3-foliolate, with shorter leaflets; flowers in short few-flowered racemes; petals white, erect, about 5 mm. long; fruit red, acid, hemispheric. Perhaps not distinct from *R. melanolasius*. *R. acalypheus*, *B. subcordata*, *B. cataphracta*, and *B. filipendula* Greene. Mountains. Mont.—Wyo.—Ida.—Nev.

16. *R. macropetalus* Dougl. Stem biennial, terete, often purplish, climbing or decumbent, sparingly hirsute or glabrous, armed with small, slightly retrorse prickles; leaves ternate; terminal leaflet broadly ovate or subcordate, often more or less lobed, double-serrate, green and sparingly hirsute on both sides; lateral leaflets ovate, subsessile; inflorescence corymbose, armed with weak prickles and slightly glandular; petals of the staminate flowers 12–16 mm. long, elliptic, white, those of the essentially pistillate flowers oval, 7–10 mm. long; fruit hemispheric or slightly elongate, black, sweet. CREEPING BLACKBERRY. Low woods: B.C.—Ida.—n Calif. Submont. My—Je.

36. *RŌSA* (Tourn.) L. ROSE.

Shrubs or vines, usually prickly. Leaves alternate, pinnate, with more or less adnate stipules, and serrate leaflets. Flowers perfect, solitary or corymbose. Hypanthium well-developed, urceolate, globose, ellipsoid or turbinate, contracted at the mouth, enclosing the achenes, becoming fleshy in fruit. Sepals 5 (rarely 4), with or without bractlets. Petals normally 5 (rarely 4), or by the transformation of the stamens numerous, spreading, usually obovate. Stamens numerous, inserted on the thickened margin of the hypanthium. Pistils numerous or several, inserted in bottom of the hypanthium or also on the inside walls of the same. Styles ventral, reaching the mouth of the hypanthium or long-exserted, sometimes united into a column. Achenes bony.

Pistils numerous: styles as well as the upper part of the hypanthium persistent, sepals in fruit erect or ascending, persistent.

Infrastipular prickles not present, branches mostly unarmed and young shoots bristly, but not prickly.

Inflorescence corymbose, terminating the stems (or rarely the branches); plant suffrutescent, stem usually dying back to near the ground, leaflets 9–11.

Leaves glabrous or nearly so.

Leaflets mostly 2–5 cm. long, not glaucous, decidedly acute, plant 3 dm.

high or more, flowers corymbose. 1 *R. arkansana*

Leaflets rarely more than 2 cm. long, mostly rounded at the apex, somewhat glaucous beneath, plant 1–2 dm. high; flowers 1–3.

2 *R. Lunellii*.

Leaves densely pubescent, especially beneath.

Upper stipules and bracts not densely glandular; leaflets 1.5–4 cm. long; plant 3–5 dm. high. 3 *R. suffulta*

Upper stipules and bracts densely glandular, leaflets seldom more than 1.5 cm. long, plant 1–3 dm. high. 4 *R. alcea*.

Inflorescence of solitary or few corymbose flowers at the end of lateral branches; plant shrubby, leaflets usually 5 or 7, or 9 only on the young shoots.

- Hypanthium decidedly pear-shaped or elliptic, acute at the base, with a distinct neck at the top.
 Sepals rarely more than 1 cm long; bark yellowish green 5. *R. collaris*.
 Sepals 2-3 cm long, bark brown.
 Leaflets conspicuously glandular-granuliferous, but scarcely at all hairy beneath, rounded-oval, double-toothed 6. *R. Engelmannii*.
 Leaflets densely pubescent, but rarely slightly if at all glandular-granuliferous beneath, mostly elliptic, simple-toothed.
 Hypanthium subglobose, almost without a neck. 7. *R. acicularis*.
 Infrafructular prickles usually present. 8. *R. Bourgeautiana*.
 Flowers mostly solitary, petals usually 2.5 cm long or more, fruit 12-20 mm thick.
 Prickles straight or nearly so.
 Hypanthium densely prickly. 9. *R. MacDougalii*.
 Hypanthium not prickly or rarely slightly so.
 Leaflets more or less double-toothed, more or less glandular-granuliferous beneath; stipules and rachis glandular.
 Leaflets very thin, pale and slightly glandular-granuliferous, but not muriculate beneath 10. *R. nutkana*.
 Leaflets thicker, dark green on both sides, conspicuously glandular-muriculate beneath 11. *R. muriculata*.
 Leaflets simple-toothed, puberulent but not glandular-granuliferous beneath, rachis rarely glandular 12. *R. Spaldingii*.
 Prickles more or less distinctly curved.
 Hypanthium prickly.
 Stem stout, 1 m. high or more; leaflets usually more than 3 cm. long 13. *R. Underwoodii*.
 Stem low, usually less than 3 dm high, leaflets usually not more than 2 cm long 16. *R. aciculata*.
 Hypanthium smooth.
 Prickles very large and flat, twigs densely glandular and pubescent. 14. *R. Durandii*.
 Prickles short and slender, not conspicuously flattened, twigs not conspicuously glandular, mostly glabrous.
 Leaflets perfectly glabrous or merely glandular-granuliferous beneath.
 Stem 1 m. high or more, leaflets usually more than 2 cm. long, pale or light green, rather firm, rarely double-serrate, not glandular-granuliferous beneath, calyx not densely glandular 15. *R. mehna*.
 Stem usually less than 3 dm. high, leaflets usually less than 2 cm. long, dark green, glandular-double-toothed, calyx usually covered with stalked glands 16. *R. aciculata*.
 Leaflets sparingly pubescent beneath 17. *R. oreophila*.
 Flowers mostly corymbose, if solitary the petals 2 cm long or less, fruit rarely more than 1 cm thick.
 Prickles more or less curved.
 Leaflets finely puberulent or glandular-granuliferous, or both beneath.
 Hypanthium ellipsoid, young shoots with rather few strong curved prickles. 18. *R. neomexicana*.
 Hypanthium globose, young shoots with fine, often rather many prickles. 19. *R. puberulenta*.
 Leaflets perfectly glabrous. 20. *R. manca*.
 Prickles straight or nearly so.
 Hypanthium globose, neck usually obsolete.
 Stipules, petioles, and rachis conspicuously glandular.
 Stipules, petioles, and rachis not conspicuously glandular, usually glandless 21. *R. Fendleri*.
 Leaflets glabrous or nearly so.
 Leaves yellowish green, fruit orange; corymb several-flowered 22. *R. chrysocarpa*.
 Leaves dark green above, paler beneath, fruit purplish red, flowers 1-3. 23. *R. Woodsii*.
 Leaflets more or less pubescent beneath.
 Leaflets elliptic or oval, equally green on both sides.
 Leaflets broadly oval, thin, 2-5 cm long, plant nearly unarmed. 24. *R. salicorum*.
 Leaflets narrowly oval, less than 3 cm. long, rather firm; plant prickly. 25. *R. ultramontana*.
 Leaflets obovate, or if elliptic, more or less glaucous beneath.
 Leaflets thin, very sharply serrate, equally green on both sides; sepals with a few slender bristles near the margins, prickles very slender. 26. *R. praetincta*.
 Leaflets firmer, paler beneath; sepals without bristles, prickles stouter. 27. *R. Macounii*.
 Hypanthium elongate, pear-shaped, with a distinct neck 28. *R. pyrifera*.
 Pistils few; styles deciduous with the upper part of the hypanthium, which falls off as a ring.

Leaflets very thin, scarcely paler beneath, with distinct reticulations.

29. *R. gymnocarpa*.

Leaflets not very thin, pale and indistinctly reticulate beneath.

30. *R. leucopsis*.

1. *R. arkansana* Porter. Stem erect, 2-4 dm. high, copiously bristly, mostly simple, killed back to near the root; glabrous or nearly so, glandular-toothed; rachis and petiole glabrous or sparingly pilose, sometimes glandular; leaflets elliptic, 1.5-6 cm. long, glabrous and shining, coarsely and sharply serrate; hypanthium subglobose, glabrous, without a neck, in fruit 12-15 mm. broad; sepals somewhat glandular on the back; petals obcordate, 2-2.5 cm. long. Plains and cañons: Colo.—Kans.—Wis.—Minn. *Plain—Submont.* Je-Jl.

2. *R. Lunellii* Greene. Stem erect, simple, 1-3 dm. high, densely bristly; sepals glabrous or nearly so, sometimes glandular, entire or gland-toothed on the margins; petiole and rachis glabrous or sparingly puberulent, sometimes glandular; leaflets elliptic or oval, serrate, 1-2.5 cm. long, glabrous on both sides or sparingly pubescent on the veins beneath; hypanthium globose, glabrous, in fruit orange-red and 10-12 mm. thick; sepals glandular on the back; petals rarely 2 cm. long, obcordate. Plains and hills: Man.—N.D.—S.D. *Plain—Submont.* Je-Jl.

3. *R. suffulta* Greene. Stem erect, 3-5 dm. high, usually simple, dying back to near the ground, densely bristly, green; stipules densely and finely pubescent, glandular-dentate on the margins; leaflets obovate, 1.5-4 cm. long, light green, finely and rather densely pubescent on both sides or in age glabrate above, densely serrate; rachis and petiole finely pubescent; hypanthium globose, glabrous or rarely bristly, in fruit about 1 cm. broad; sepals somewhat glandular on the back; petals obcordate, 2-2.5 cm. long. *R. arkansana* S. Wats., not Porter. *R. pratincola* and *R. helophila* Greene. Prairies and plains: Ill.—Tex.—N.M.—Wyo.—Alta.—Man. *Plain—Submont.* Je-Au.

4. *R. alcea* Greene. Stem low, 1-3 dm. high, terete, densely bristly, even the floral branches; stipules puberulent, and glandular-hispid and even bristly on the back, glandular-ciliate on the margins, rather broad; rachis and petiole puberulent and glandular; leaflets obovate, 1-2 cm. long, serrate above the middle, glabrous above, finely and densely pubescent and strongly veined beneath; hypanthium globose, glandular-bristly; sepals glandular-hispid on the back; petals obcordate, 15 mm. long. Plains: Sask.—N.D.—Man.—Colo. *Plain.*

5. *R. collaris* Rydb. Stem bristly, but not copiously so, yellowish green, about 1 m. high; stipules glandular-dentate, slightly puberulent; petiole and rachis somewhat puberulent and glandular; leaflets mostly 5, oval, coarsely serrate, 1-3 cm. long, glabrous above, finely puberulent beneath; hypanthium small, ellipsoid, contracted into a rather long neck, glabrous; sepals 8-10 cm. long, lanceolate, attenuate, with rather short tips, glabrate on the back. River banks: Ida. Jl.

6. *R. Engelmannii* S. Wats. Stem low, 3-5 dm. high, densely bristly, but rarely prickly; stipules rarely pubescent, conspicuously glandular-granuliferous and glandular-ciliate; petiole and rachis more or less glandular; leaflets 5 or 7, oval, 1-3 cm. long, doubly glandular-serrate, shining above, paler beneath; hypanthium decidedly ellipsoid or pear-shaped, in fruit 8-10 mm. thick, and 12-15 mm. long, with a distinct neck; sepals slightly if at all glandular; petals broadly obcordate, about 2.5 cm. long. Woods: Colo.—s Mont.—N.D. *Submont.—Mont.* Je-Jl.

7. *R. acicularis* Lindl. Stem low, about 1 m. high, densely covered with straight bristles or weak prickles; stipules pubescent, more or less glandular-granuliferous and glandular-ciliate; leaflets 3-7, usually 5, elliptic or oval, 1.5-5 cm. long, simply and regularly serrate, dull and glabrous above, pale and finely and densely pubescent beneath; hypanthium glabrous, pear-shaped or elliptic, in fruit 1-1.5 cm. broad and 1.5-2 cm. long, usually with a neck; sepals pubescent and more or less glandular on the back; petals obcordate, 2-2.5 cm. long. Woods: Alaska—Wyo.—Mich.—N.Y. *Boreal—Mont.* Je-Au.

R. acicularis × **nutkana**. This hybrid has the bristly stems, the elongate hypanthium, and the narrow, elliptic leaflets of *R. acicularis*, but the bristles are stronger, some of them stout and nearly 1 cm. long, the leaflets are often double-toothed and much less hairy beneath than in *R. acicularis*. Mont.

8. R. Bourgeauiana Crep. Stem usually low, 3–10 dm. high, densely covered with straight bristles or weak prickles; stipules slightly, if at all, pubescent, glandular-dentate; petiole and rachis somewhat pubescent and glandular; leaflets usually 5 or 7, broadly elliptic, 1.5–5 cm. long, usually rounded or obtuse at both ends, more or less double-serrate, thin, glabrous or nearly so above, slightly pubescent and glandular-granuliferous beneath; hypanthium glabrous, in fruit 12–15 mm. broad; sepals slightly, if at all, glandular; petals broadly obovate, 2–2.5 cm. long, rose-colored. *R. Sayi* S. Wats., not Schwein. Woods: Ont.—Colo.—Mont.—Mack. *Boreal*—*Submont.*—*Mont.* Je—Jl.

R. Bourgeauiana × **nutkana**. This resembles *R. Bourgeauiana* in the numerous bristles or rather weak prickles, but the prickles are stronger than in that species and many of them have broadened bases, the leaves are also firmer and conspicuously double-toothed as in *R. nutkana*. Mont.

9. R. MacDougali Holz. Stem erect, 1–2 m. high, usually armed with paired straight, rather stout infrastipular prickles, 7–10 mm. long; floral branches with weaker prickles or unarmed, stipules puberulent and somewhat glandular beneath, glandular-dentate; petiole and rachis puberulent and slightly glandular; leaflets usually 7, oval, 1.5–5 cm. long, coarsely and rather regularly toothed, glabrous or nearly so above, puberulent beneath, pedicels more or less glandular-bristly; hypanthium subglobose, densely bristly or prickly, without a neck, in fruit 12–18 mm. broad; sepals glandular on the back; petals broadly obovate, 2–3 cm. long, rose-colored. *R. nutkana hispida* Fern. Woods: Ida—w Mont.—n Utah—Wash.—B.C. *Submont.* My—Je.

10. R. nutkana Presl. Stems stout, erect, usually 1–1.5 m. high, armed usually with paired large straight prickles, which are somewhat flattened below, 6–12 mm. long; floral branches glabrous, with smaller infrastipular prickles; stipules mostly glabrous, strongly glandular-dentate on the margins; petiole and rachis glandular-puberulent; leaflets 5–9, usually 7, rounded-ovate, rounded at the both ends or acute at the apex, double-serrate, with glandular teeth, 1.5–5 cm. long; hypanthium glabrous; sepals glabrous or rarely glandular on the back; petals rose-colored, rarely white, broadly obovate, 2–3.5 cm. long. Woods: Alaska—w Mont.—Wyo.—n Calif. *Submont.*—*Mont.* My—Jl.

11. R. muriculata Greene. Stem stout, erect, 1 m. high or more, armed with paired infrastipular prickles, which are straight, stout, slightly ascending, 8–10 mm. long, flattened below; floral branches unarmed or with weak prickles; stipules densely glandular-muricate; petioles and rachis strongly glandular and more or less prickly; leaflets 5 or 7, broadly oval or subrotund, rounded at the apex, glandular double-toothed, dark green on both sides, 1.5–3 cm. (rarely 4 cm.) long; hypanthium subglobose, glabrous, in fruit 12–15 mm. in diameter; sepals glandular-hispid on the back; petals obovate, 2–2.5 cm. long. Woods: B.C.—Mont.—Ore. *Submont.*

12. R. Spaldingii Crep. Stem erect, about 1 m. high, usually armed with straight paired prickles, 5–10 mm. long; floral branches glabrous, somewhat prickly; stipules finely puberulent and somewhat glandular-toothed; petiole and rachis grayish-puberulent and sometimes slightly glandular; leaflets 5–7, oval or rounded, coarsely and usually regularly toothed, 1.5–5 cm. long, pale and puberulent beneath; hypanthium glabrous; sepals glabrous or very rarely glandular on the back; petals rose-colored, 2–3 cm. long; hypanthium in fruit globose, without neck, 12–18 mm. thick. Woods: B.C.—Wyo.—Utah—Ore. My—Jl.

13. R. Underwoodii Rydb. Stem 1–2 m. high, glabrous, armed with stout, recurved, paired infrastipular prickles (and also often with scattered ones) 5–10 mm. long; stipules puberulent, glandular-dentate; petiole and rachis puberulent and with sessile glands; leaflets 5–7, obovate or oval, 2–4 cm. long, somewhat irregularly or doubly serrate, glabrous on both sides or finely puberulent and paler beneath; hypanthium more or less pear-shaped, sparingly bristly, in fruit about 2–3 cm. long and 1.5–2 cm. broad; sepals glandular and pubescent on

the back; petals obcordate, about 2.5 cm. long and fully as wide. Mountains: s Colo. *Submont.* Je.

14. *R. Durandii* Crep. Stem terete, armed with very stout prickles, which are about 1.5 cm. long, very flat, curved, puberulent; branches pubescent and densely glandular-hispid; stipules copiously glandular on the back, densely glandular-ciliate; petiole and rachis unarmed, pubescent and very glandular; leaflets 5-9, broadly oval, rounded at the base, acute at the apex, glabrous above, densely glandular-granuliferous beneath, double-toothed, with gland-tipped teeth; pedicels densely glandular; hypanthium smooth or slightly glandular at the base, globose, in fruit 12-15 mm. broad; sepals glandular on the back. Banks: Orc —w Ida. Je.

15. *R. melina* Greene. Stem stout, about 1 m. high, glabrous, armed with curved prickles, which are 3-8 mm. long, flattened at the base; stipules glandular-denticulate on the margins, usually glandular-granuliferous on the back; petiole and rachis more or less glandular; leaflets mostly 7, oval or obovate, coarsely serrate, 1.5-3 cm. long, glabrous or essentially so on both sides; hypanthium glabrous, globose, in fruit about 12 mm. thick; sepals sparingly glandular-hispid on the back; petals rose-colored, obcordate, 2-2.5 cm. long. *R. pandorana* Greene. Mountains: Utah—Colo *Submont.*—Mont. Je—Jl.

16. *R. aciculata* Cockerell. Stem low, much branched, 1-3 dm. high, armed with curved prickles, which are 3-5 mm. long and flattened at the base; branches less than 1 dm. long, usually armed; stipules densely glandular on the margins and the back; rachis and petiole copiously glandular; leaflets 5 or 7 or on the young shoots 9, oval, acute or obtuse, 1-2 cm. long, more or less double-serrate, especially those of the young shoots, with ovate gland-tipped teeth; flowers solitary; pedicels glabrous or often more or less glandular-hispid; hypanthium globose, glabrous or glandular-hispid; sepals densely glandular-hispid; petals rose-colored or white, obcordate, about 2.5 cm. long. Hillsides: Colo.—se Utah. *Mont.* Jl—Au.

17. *R. oreophila* Rydb. Stem 2-3 m. high, glabrous, mostly armed with weak curved prickles 5 mm. long, or rarely unarmed; stipules finely puberulent and glandular-denticulate; rachis and petiole finely pubescent and with sessile glands; leaflets 5-7, oval or ovate, 2-3.5 cm. long, glabrous and dark green above, sparingly and finely pubescent and paler beneath, coarsely and simply serrate; flowers mostly solitary; hypanthium glabrous, obovate, usually acute at the base, without distinct neck, when ripe fully 2 cm. long and 15-18 mm. broad; sepals finely pubescent on the back; petals obcordate, 2-2.5 cm. long, rose-colored. *R. Bakeri* Rydb., not Desegl. Mountains: Colo.—Utah. *Submont.* Jl

18. *R. neomexicana* Cockerell. Stem 1-2 m. high, terete, armed with usually paired infrastipular prickles, which are 5-10 mm. long, more or less recurved; stipules glabrous or finely pubescent, somewhat glandular-dentate on the margins; rachis puberulent and sometimes glandular; leaflets 5-7, obovate or on the young shoots elliptic, 1-3.5 cm. long, puberulent or nearly glabrous, glandular-pruinose and rather pale beneath, with ovate teeth; hypanthium ellipsoid, tapering at the base, glabrous, purple, in fruit 8-10 mm. thick, 15 mm. long; sepals glabrous without; petals 1.5-2 cm. long, obcordate. Hillsides and cañons: Ariz.—N.M.—s Colo.—Utah. *Son.*—*Submont.* Je.

19. *R. puberulenta* Rydb. Stem 1-2 m. high, brown, terete, slender, armed with slender, slightly curved prickles about 5 mm. long; young shoots bristly; stipules finely puberulent; petiole and rachis puberulent, unarmed; leaflets 5-7 or on the new shoots sometimes 9, broadly oval, light green, glabrous above, finely puberulent beneath, coarsely serrate, not glandular, 2-4 cm. long; hypanthium glabrous, globose, in fruit 12-13 mm. thick; sepals puberulent on the back; petals about 2 cm. long, rose-colored. Cañons and banks: Nev.—Utah—Ida. *Son.*—*Mont.* Je—Au.

20. *R. manca* Greene. Stem low, 2-10 dm. high, terete, armed with rather few curved prickles 3-5 mm. long and flattened at the base; stipules glandular-denticulate; petiole and rachis more or less glandular; leaflets mostly 7, rarely 2 cm. long, oval or obovate, thin, more or less double-toothed, with gland-tipped

teeth, glabrous on both sides; flowers solitary; hypanthium glabrous, globose, in fruit about 1 cm. thick; sepals glabrous or sparingly glandular; petals rose-colored, 1.5–2 cm. long. Cañons: Colo.—e Utah—Ariz. *Submont.*—Mont Je—Au.

21. *R. Fendleri* Crep. Stem low, 1 m. high or less, terete, armed with a few prickles, which are straight, slender, 5 mm. long or less; stipules glandular-pruinose on the back, more or less glandular-dentate; rachis and petiole densely glandular-puberulent and often somewhat glandular-hispid or with weak prickles; leaflets 5–7, elliptic, oval, or obovate, 1–3 cm. long, rather thin, green and glabrous above, slightly paler, puberulent and glandular-pruinose beneath, often double-serrate; hypanthium globose, glabrous, in fruit 8–10 mm. broad; sepals sparingly glandular on the back; petals rose-colored, obcordate, about 1.5 cm. long. Woods and copses: N.M.—Ariz.—S.D.—Mont. *Plain*—*Submont.* My—Jl.

***R. Bourgeauiana* × *Fendleri*.** This resembles *R. Fendleri* in habit, the corymbose inflorescence and the small flowers and fruit, but the plant is much more prickly, the leaflets firmer and more conspicuously double-toothed. Mont.

22. *R. chrysocarpa* Rydb. Stem tall, 1–3 m. high, terete, at first light-yellowish green, armed with straight prickles, somewhat retrorse, terete, 3–7 mm. long, some of them infrastipular, others scattered; young shoots copiously armed with bristle-like prickles; stipules glandular-dentate or ciliate; petiole and rachis glabrous, sometimes with a few prickles; leaflets 5–7, elliptic or oval, thin, glabrous on both sides, yellowish green, coarsely serrate throughout, 1–4 cm. long; hypanthium globose, at first glabrous, light green, in fruit about 1 cm. thick and orange; sepals glabrous or nearly so on the back. Cañons: Utah—Ida. *Son*—*Submont.* Je.

23. *R. Woodsii* Lindl. Stem terete, glabrous, 0.5–2 m. high, armed with rather numerous, straight or slightly curved prickles, 4–8 mm. long; stipules glabrous, usually glandless, entire or somewhat toothed; rachis and petiole glabrous, occasionally with a few prickles or stalked glands; leaflets 5–7, obovate, cuneate at the base, serrate above, glabrous on both sides, glaucous beneath, 1–2 cm., rarely 3 cm. long; hypanthium globose, glabrous, in fruit 8–10 mm. thick; sepals glabrous or slightly glandular on the back. *R. Macounii* Rydb (Fl. Colo.), not Greene. *R. Sandbergii*, and (?) *R. fimbriatula* Greene. *R. deserti* Lunell. River banks and copses: Sask.—N.D.—Kans—Colo.—Utah—B.C. *Plain*—Mont. Je—Jl.

24. *R. salictorum* Rydb. Stem 3–5 m. high, unarmed or nearly so, except the new shoots; infrastipular prickles if present small and straight; stipules more or less toothed, finely puberulent; leaflets 5–7, broadly oval, coarsely and evenly serrate, glabrous above, finely puberulent beneath, 2–4 cm. long; hypanthium glabrous, globose, in fruit about 1 cm. broad; sepals glabrous on the back; petals pink, about 15 mm. long. Among willows: Nev.—Ida.—(?) Utah.) Jl.

25. *R. ultramontana* (S. Wats.) Heller. Stem tall, 1–3 m. high, rarely 5 m. high, terete, armed with straight prickles, 5–7 mm. long; stipules puberulent and often pruinose on the back, usually denticulate; leaflets usually 7, oval, usually rounded at both ends, serrate, with broad teeth, 2–4 cm. long, green and dull on both sides, rather firm, glabrous above, puberulent and often also pruinose beneath; hypanthium globose, glabrous, in fruit 8–10 mm. thick; sepals glabrous or slightly puberulent on the back (in the related *R. pisocarpa* of the Pacific Coast glandular on the back); petals obcordate, 1.5 cm. long or a little more. *R. californica ultramontana* S. Wats. Woods and copses: Ore.—Mont—Nev.—n Calif. *Submont.* Je—Au.

26. *R. praetincta* Cockerell. Stem about 1.5 m. high, armed with numerous often bristle-like prickles, which are terete, 5–8 mm. long; stipules slightly puberulent or glabrate, often more or less toothed; rachis and petiole finely puberulent, usually with a few bristle-like prickles; leaflets obovate or rarely oval, very thin, 1–3 cm. long, sharply serrate, with incurved teeth, green on both sides, glabrous above, finely puberulent on the veins and pruinose beneath; hypanthium glabrous, globose; sepals glabrous on the back; petals about 2 cm. long,

broadly obcordate. *R. aciculata* Rydb. (Fl. Colo.), not Cockerell. Banks and copses: N.M.—Colo. *Son.*—*Submont.* Je.

27. *R. Macounii* Greene. Stem 0.5–2 m. high, usually armed with straight terete prickles, 5–8 mm. long; new shoots bristly; stipules entire or glandular-denticulate, puberulent on the back; rachis and petiole finely puberulent, unarmed; leaflets obovate, serrate, 1–3 cm. long, green and glabrous above, pale or glaucous, finely puberulent and sometimes pruinose beneath; hypanthium globose, without a neck, glabrous, 8–10 mm. thick; sepals glabrous or sparingly pubescent on the back; petals about 2 cm. long, obcordate, rose-colored. *R. Woodsii* S. Wats., not Lindl. *R. grosseserrata* E. Nels. *R. Maximiliani* Rydb., not Nees. Banks and copses: Sask.—Neb.—w Tex.—N.M.—Utah—e Wash. *Plain*—*Submont.* My—Jl.

***R. Bourgeauliana* × *Macounii*.** This resembles *R. Macounii* in habit and flowers, but the young shoots are exceedingly bristly and the leaflets, especially those of the shoots, are very broad and rounded, with broad occasionally double teeth, and slightly glandular-granuliferous. *Mont.*

28. *R. pyrifera* Rydb. Stem 1 m. high or more, armed with slender, straight prickles 5–8 mm. long; stipules finely puberulent and usually glandular-granuliferous on the back; petiole and rachis puberulent and often glandular; leaflets about 7, oval, 2–4 cm. long, coarsely serrate, dark green and glabrous above, finely puberulent and more or less glandular-granuliferous beneath; hypanthium pyriform or ellipsoid, acute at the base, with a distinct neck at the apex, in fruit 10–12 mm. thick and 15–20 mm. long; sepals glandular on the back; petals obcordate, about 2 cm. long. Banks: *Mont.*—*Wyo.*—*Utah*—*Calif.*—*Wash.* *Submont.* Je—Jl.

29. *R. gymnocarpa* Nutt. Stem slender, 1–3 m. high, terete, often very bristly and with infrastipular prickles, which are very slender, terete, sometimes not larger than the scattered bristles, sometimes 1 cm. long; stipules glabrous on the back, glandular-ciliate and dentate on the margin; rachis and petiole usually glandular-hispid; leaflets 5–7 (rarely 9), from suborbicular to elliptic, 1–3.5 cm. long, thin, shining above, dull beneath, glabrous on both sides, double-serrate, with gland-tipped teeth; flowers usually solitary; hypanthium ellipsoid, in fruit 7–9 mm. thick, 8–10 mm. long; sepals 5–8 mm., sometimes 10 mm. long, purplish, glabrous on the back; petals 10–18 mm. long, obcordate. Woods: B.C.—*Mont.*—*Ida.*—*Calif.* *Son.*—*Submont.* My—Jl.

30. *R. leucopsis* Greene. Closely related and scarcely distinct from *R. gymnocarpa*. Stem 1 m. high or more, sparingly bristly, with ascending bristles; stipules glandular-ciliate and glandular on the back; petiole and rachis glandular-hispid; leaflets oval or obovate, deeply double-serrate, with gland-tipped teeth, glabrous on both sides, pale; flowers solitary; hypanthium glabrous, ellipsoid, becoming globose or pear-shaped in fruit, 4–6 mm. thick; sepals glabrous on the back, petals obcordate, 10–12 mm. long. Woods and copses: Ore.—*Ida.*—*Mont.*—*B.C.* *Submont.* My—Jl.

FAMILY 61. MALACEAE. APPLE FAMILY.

Trees or shrubs, with simple or pinnate, alternate leaves, with stipules. Flowers perfect, regular. Hypanthium well developed, adnate to the ovary, becoming fleshy, and constituting a part of the fruit. Sepals and petals mostly 5. Stamens numerous, distinct, inserted on the margins of the receptacle. Gynoecium of 1–5 united carpels; cells of the ovary and styles as many, the latter distinct or partly united. Fruit a more or less fleshy pome.

Cells of the fruit by false partitions twice as many as the styles.

Flowers racemose, styles 3–5, rarely 2

Flowers solitary or in 2- or 3-flowered corymbs; styles 2.

Cells of the fruit as many as the styles.

Leaves pinnately compound; carpels leathery at maturity.

Leaves simple, more or less pinnately lobed, carpels bony at maturity

1. AMELANCHIER.

2. PERAPHYLLUM.

3. SORBUS.

4. CRATAEGUS.

1. **AMELANCHIER** Medic. SERVICE-BERRY, JUNE-BERRY, SHADBERRY.

Shrubs or small trees. Leaves alternate, simple, petioled, toothed or entire-margined. Flowers in ours racemose. Hypanthium campanulate, becoming globose, adnate to the ovary. Sepals 5, reflexed, persistent. Petals 5, white. Stamens many; filaments subulate. Styles 3-5, rarely less. Ovary inferior or nearly so, the cells becoming twice as many as the styles, by false partitions intruding from the back. Ovules solitary in each cell, erect. Pome berry-like, 6-10-celled.

Top of the ovary, winter buds, and leaves glabrous from the beginning, fruit juicy; styles mostly 5

Sepals mostly sparingly hairy within.

Petals oblanceolate, 18-20 mm. long; leaves thin, green.

1. *A. Cusickii*

Petals oblong, 10-15 mm long; leaves firmer, pallid

2. *A. basalticola*

Sepals perfectly glabrous on both sides; petals 10-12 mm long.

Leaves green; styles 5, all united, twigs brown

Leaves moderately toothed, lower one-third of the blade entire, teeth rarely over 2 mm long

3. *A. polycarpa*

Leaves coarsely toothed to near the base, teeth 3-4 mm. long

4. *A. pumila*

Leaves bluish-green, styles 4, two and two united, twigs gray.

11. *A. Jonesiana*

Top of the ovary and usually the winter buds pubescent; leaves hairy beneath, at least when young

Fruit glabrous, in age purple, juicy; styles mostly 5, rarely 4.

Leaves glabrous above, white-tomentose but soon glabrate beneath.

Leaves mostly acute at the apex, toothed to near the base.

Leaf-blades elliptic, finely toothed, short-acuminate

5. *A. canadensis*

Leaf-blades oval, coarsely toothed, acute or obtuse

6. *A. humilis*

Leaves truncate or rounded at the apex, mostly toothed above the middle.

Leaf-blades thin, usually oval

7. *A. florida*

Leaf-blades firm, usually suborbicular.

8. *A. alnifolia*

Leaves more or less permanently pubescent on both sides, more or less pale

Leaves neither coarsely toothed nor strongly veined

9. *A. oreophila*

Leaves coarsely toothed and strongly veined

10. *A. mormonica*

Fruit even in age more or less pubescent, orange or yellow, not juicy; styles mostly 3 or 2

Leaves coarsely toothed; branches gray.

Leaf-blades suborbicular, truncate at the apex.

Leaves dentate, teeth acute

12. *A. Bakeri*

Leaves crenate, teeth broad, rounder.

13. *A. crenata*

Leaf-blades oval, acute to rounded at the apex.

14. *A. ulahensis*

Leaves finely toothed; branches brown or cherry-red.

15. *A. prunifolia*

1. ***A. Cusickii*** Fernald. A shrub 2-6 m. high, with smooth reddish bark; leaves about 3 cm long, ovate-oblong, rounded at the apex, or the smaller acutish, serrate, with rather coarse teeth, to near the base; racemes about 6-flowered; sepals lanceolate, acuminate; fruit about 1 cm., scarlet, tardily turning black. Stony hillsides: B.C.—Mont —(? Utah)—Ore. *Submont.* Ap-Je.

2. ***A. basalticola*** Piper. A small shrub, with grayish bark; leaves orbicular or oval, mostly truncate at both ends, usually coarsely serrate only above the middle, 1.5-2 cm. long; racemes short, few-flowered; sepals lanceolate, attenuate; stamens 20; fruit 8-9 mm, dark purple. Bluffs and copses: Wash.—Ida. *Son.* Ap-Jl.

3. ***A. polycarpa*** Greene. A shrub 1-3 m. high or according to original description a small tree, with reddish bark; leaves broadly oval, 2-4 cm. long, deep green above, pale beneath; racemes short; sepals triangular-lanceolate, acuminate; fruit depressed, globose, 8-9 mm. broad, dark purple, juicy. Hills and table lands: Wyo.—N.M.—Utah. *Submont.*—*Son.* My-Jl

4. ***A. pumila*** Nutt. A low shrub, 0.5-1 m. high, with depressed branches and dark brown twigs; leaves glabrous, broadly oval, rounded at both ends, rather thin, 2-5 cm. long; racemes few-flowered; sepals narrowly lanceolate, attenuate; petals oblong, about 1 cm. long; fruit purple, about 7 mm. thick. Mountains: Wyo.—Utah—Colo. *Submont.* Je-Jl.

5. ***A. canadensis*** (L.) Medic. A bushy tree, 5-10 m. high, or sometimes a tall shrub; leaves rounded or cordate at base, usually acuminate, sharply and finely serrate, white-tomentose when young, glabrate in age; racemes 3-5 cm. long; sepals broadly oblong-lanceolate, abruptly pointed, tomentose; petals

oblong, 10-14 mm. long; fruit purple, not very juicy. Copses: Me.—S.C.—Ark.—Minn.—Alta. *Boreal—Mont.*

6. **A. humilis** Wieg. A stoloniferous shrub, 0.5-1.5 m. high, with grayish brown twigs; leaves oval-oblong or oval, 2.5-5 cm. long, subcordate or rounded at the base, green above, tomentose when young beneath, becoming glabrate and glaucous; racemes 4-5 cm. long, sepals triangular-lanceolate; petals obovate-oblong, 7-10 mm. long; fruit almost black, glaucous, juicy. Banks and hills: Vt.—Neb.—Alta.—(? Mack.) *Plain—Mont.* Je.

7. **A. florida** Lindl. A shrub or low tree, 2-5 m. high, not stoloniferous, with grayish or brownish twigs; leaves elliptic or oval, glabrous above, floccose beneath when young, but soon glabrate, 2-4 cm. long; racemes 4-8 cm. long; sepals lanceolate, acute; petals 12-15 mm. long, oblanceolate; fruit juicy, purple, with a bloom, 1 cm. broad. *A. elliptica* A. Nels. River banks and hillsides: B.C.—Alta.—Colo.—Calif. *Submont.* Ap-Je.

8. **A. alnifolia** Nutt. A low shrub, 1-2 m. high, with dark gray twigs; leaves suborbicular or round-oval, 2-5 cm. long, glabrous above, somewhat tomentose beneath; raceme 2-4 cm. long; sepals lanceolate; petals oblanceolate-oblong, about 1 cm. long; fruit purple, juicy, with a bloom, 8-9 mm. thick. Banks and hills: Sask.—Neb.—Colo.—Ida.—Yukon; Mich. *Plain—Mont.* My-Jl.

9. **A. oreophila** A. Nels. A low, branched shrub, 1-2 m. high, growing in clumps; leaves broadly oval, or obovate, 2-4 cm. long, rounded at the apex; racemes short and dense; sepals narrowly lanceolate; petals oblanceolate or spatulate, about 8 mm. long; fruit globose, purplish black, little juicy. Open stony slopes: Mont.—N.M.—Nev. *Submont.—Mont.* My-Je.

10. **A. mormonica** C. K. Schneider. A low shrub; leaves rounded-oval, rounded at both ends, 2-3.5 cm. long, coarsely dentate, dark green above, grayish green beneath; racemes few-flowered; sepals lanceolate; petals oblong-lanceolate, about 1 cm. long; fruit globose, slightly juicy; styles 4 or 5. Hillsides: Ariz.—Wyo.—N.M. *Son.—Submont.* My-Je.

11. **A. Jonesiana** C. K. Schneider. A low shrub; leaves rounded-oval, truncate at the apex, irregularly dentate from below the middle to the apex, about 2 cm. long; racemes short, few-flowered; sepals elongate-lanceolate, acuminate; petals ovate-oblong, about 11 mm. long; stamens 8-10. Cañons: Utah—Ariz. (acc. to Schneider). *Submont.* My.

12. **A. Bakeri** Greene. A shrub, divaricately branched, with reddish puberulent bark; leaf-blades orbicular, 1.5-2 cm. long, coarsely toothed, except the entire subcordate base, finely tomentulose; racemes 2-3 cm. long; sepals lanceolate, villous on both sides; petals 7-8 mm. long, elliptic; fruit orange, not juicy. *A. Purpusi* Koehne. Hills: Colo.—N.M. *Submont.—Mont.* My.

13. **A. crenata** Greene. A low shrub, divaricately branched; leaf-blades suborbicular or broadly oval, 1.5-2.5 cm. long and nearly as broad, crenate except at the base, tomentulose on both sides, paler beneath; racemes very short; sepals lanceolate, villous; petals 6-7 mm. long, oblanceolate; fruit unknown. Rocks: N.M.—(? Ariz.)—se Utah—s Colo. *Son.* Ap.

14. **A. utahensis** Koehne. A shrub 0.5-5 m. high, with gray or brown twigs, leaves elliptic or oval, 1-3 cm. (rarely 3.5 cm.) long, finely tomentulose, coarsely serrate; racemes 2-3 cm. long; sepals narrowly lanceolate, villous on both sides; petals elliptic, about 7 mm. long; fruit puberulent, yellow or orange, not juicy, 7-8 mm. broad. Hills: Ida.—Colo.—N.M.—Ariz. *Son.—Submont.* My-Je.

15. **A. prunifolia** Greene. A shrub, 0.5-3 m. (according to Greene even 5 m.) high, with brown, or on account of the pubescence grayish twigs, much branched; leaves 1-3 cm. long, elliptic, ovate, or oval, or rarely obovate, finely crenate-serrate, thick, finely cinereous on both sides; raceme 2-3 cm. long; sepals narrowly lanceolate, villous on both sides; petals elliptic, 8 mm. long; fruit puberulent when young, in age yellow or golden, not juicy, 6-7 mm. broad. *A. rubescens* Greene. Hills and arroyos: Colo.—Utah—N.M. *Submont.—Mont.* Ap-Je.

2. PERAPHYLLUM Nutt. SQUAW APPLE, WILD CRAB.

Low shrub, with gray branches. Leaves alternate, but crowded at the ends of the branches, serrulate or entire, simple. Flowers perfect, regular, solitary or 2 or 3 together. Hypanthium subglobose, adnate to the ovary. Sepals 5, persistent. Petals 5, broad. Ovary of 2 carpels, but 4-celled by false partitions intruded from the back. Pome fleshy, middle-sized, bitter; carpels cartilaginous. Stamens about 20.

1. *P. ramosissimum* Nutt. A low shrub, 1-2 m. high; leaves narrowly oblanceolate, obtuse or acute at the apex, acute at the base, 2-4 cm. long, sparingly appressed-silky when young, coriaceous in age, sinuately crenate; teeth when young tipped with deciduous glands; sepals triangular, reflexed, pubescent within; petals orbicular, pale pink; fruit 15-18 mm. thick, glabrous, exceedingly bitter. Dry hills: w Colo.—s Utah—n Calif.—Ore. *Son.*—*Submont.* My-Je.

3. SORBUS L. MOUNTAIN ASH.

Trees or shrubs. Leaves alternate, pinnate; leaflets several, more or less toothed; stipules deciduous. Flowers perfect, regular, in terminal compound cymes. Hypanthium urn-shaped. Sepals 5, erect or spreading, in ours deciduous. Petals white, spreading. Stamens many. Ovary inferior, adnate to the hypanthium; styles usually 3, distinct; cells of the ovary as many, with 2 ovules each. Fruit small, berry-like, in ours red and very acid; carpels cartilaginous.

Leaflets acute or acuminate at the apex, serrate to near the base; inflorescence broad and flat-topped.

Leaflets linear-lanceolate, gradually acuminate, at least five times as long as broad

1 *S. angustifolia*.

Leaflets elliptic or oblong, abruptly acuminate or acute, 2-3 times as long as broad.

2 *S. scopulina*.

Leaflets mostly rounded at the apex, entire towards the base; inflorescence small, usually round-topped.

3 *S. occidentalis*.

1. *S. angustifolia* Rydb. A shrub 2-5 m. high; young twigs and inflorescence sparingly pilose; leaflets usually 13, acute at the base, gradually acuminate at the apex, 3-7 cm. long, 7-15 mm. broad, finely and sharply serrate throughout, glabrous, slightly paler beneath; inflorescence broad, flat-topped; sepals triangular, acute; petals white, orbicular; fruit red, ellipsoid. *Pyrus sitchensis* Piper, not *Sorbus sitchensis* Roemer. Mountain slopes: n Ida.—w Mont.—Wash. *Submont.* Jl.

2. *S. scopulina* Greene. A shrub 1-4 m. high; young twigs, petioles and inflorescence sparingly villous; leaflets 11-13, elliptic or elliptic-lanceolate, rounded at the base, abruptly acute or acuminate, 3-6 cm. long, sharply and doubly serrate, glabrate, pale beneath; fruit red, subglobose, 7-8 mm. broad. *Pyrus sambucifolia* Porter, not Cham. & Schlecht. Hillsides and ravines: Alta.—N.M.—Ariz.—Ore.—B.C. *Submont.*—*Mont.* Je-Jl.

3. *S. occidentalis* (S. Wats.) Greene. A shrub 1-3 m. high; young twigs, petioles, and inflorescence finely pubescent; leaflets 9-11, oblong, acutish at the base, rounded or obtuse at the apex, 3-5 cm. long, paler beneath, rather evenly serrate above, entire towards the base; fruit red, ellipsoid, 7-8 mm. long, 6-7 mm. broad. (?) *S. sitchensis* Roemer. Hills: Yukon—Mont.—Ore—Alaska. *Submont.*—*Mont.* Je—Au.

4. CRATAEGUS L.* HAW OR HAWTHORN.

Small trees or shrubs, usually armed with thorns or spines. Leaves alternate, petioled, simple, toothed and usually more or less lobed. Flowers in terminal clusters, cymose or corymbose. Hypanthium cup-shaped or campanulate, adnate to the ovary. Sepals 5, reflexed after anthesis. Petals 5, white or pink, spreading, rounded. Stamen 5-25, inserted on the margin of the hypanthium; filaments slender, incurved. Ovary inferior, of 1-5 carpels; styles 1-5, distinct. Pome globose, pear-shaped, or ellipsoid, yellow, red, blue, or black, containing 1-5, bony and 1-seeded carpels.

* With the assistance of Mr. W. W. Eggleston.

Fruit black or nearly so when ripe; nutlets irregularly pitted on the faces; leaves glabrate beneath, more or less pubescent above.

Inflorescence glabrous; spines mostly slender.

Leaf-blades narrow, rhombic-oblanccolate or elliptic, scarcely lobed.

Leaf-blades crenate; fruit 7-8 mm. in diameter, nutlets 5. 1. *C. saligna*.

Leaf-blades irregularly serrate; fruit 8-10 mm. in diameter, nutlets usually 4. 2. *C. rivularis*.

Leaf-blades broad, rhombic, lobed and incised 3. *C. erythropoda*.

Inflorescence pubescent, spines short and stout; leaf-blades broad, ovate or obovate, somewhat lobed above the middle. 4. *C. Douglasii*.

Fruit red or red-purple, leaves pubescent beneath, at least on the veins.

Teeth of the leaves not glandular, nutlets deeply pitted on the faces.

5. *C. succulenta*.

Teeth of the leaves glandular; nutlets not pitted.

Leaf-blades suborbicular.

6. *C. chrysocarpa*.

Leaf-blades ovate, oval or obovate, more or less cuneate at the base.

Leaf-blades mostly 5-9 cm. long, with shallow, acute lobes 7. *C. Williamsii*.

Leaf-blades 2-6 cm. long, with deep, often acuminate lobes 8. *C. columbiana*.

1. *C. saligna* Greene. A tree 3-6 m. high, with spreading branches; spines 5-25 mm. long; leaf-blades thick, rhombic-oblanccolate, 1.5-5 cm. long, those of the floral branches usually obtuse, those of the shoots acute or acuminate, crenate, with short gland-teeth, paler beneath; sepals triangular, glabrous; anthers 20, yellow; fruit blue-black. *C. Wheeleri* A. Nels. River banks: Colo. *Submont.* My-Je, fruit Au.

2. *C. rivularis* Nutt. A tree 3-6 m. high, with ascending branches; spines slender, 1.5-4 cm. long; leaves lanceolate, rhombic-lanceolate or elliptic, 2.5-8 cm. long, cuneate at the base, acuminate to obtuse at the apex, slightly double-toothed, paler beneath; sepals lanceolate, long-pointed, remotely glandular-toothed; anthers 20, yellow; fruit dark crimson, becoming black. *C. Wheeleri* Rydb., not A. Nels. *C. tenuovana* A. Nels., a form with short spines. Valleys: Wyo.—Colo.—Nev.—Ida. *Submont.* My-Je.

3. *C. erythropoda* Ashe. A small tree, 2-5 m. high, widely branched; spines rather stout, 2-3 cm. long, morocco red; leaf-blades broadly oval or rhombic, 3-5 cm. long, coarsely glandular-serrate, acute or acuminate; sepals with a broad gland-margined acumination; stamens 1-8; anthers purple; styles 5; fruit dark cherry red, becoming black or dark brown. *C. cernuus* A. Nels. Banks: Wyo. *Submont.* My-Je.

4. *C. Douglasii* Lindl. A tree 5-12 m. high, with ascending branches; spines red, stout, 1-3 cm. long; leaf-blades ovate or obovate to broadly oval, 2-7 cm. long, short-acuminate, doubly-toothed and somewhat lobed above; sepals acuminate, long-hairy above; anthers 10-20, light yellow; fruit black. *C. brevispina* (Dougl.) Farwell. River banks: B.C.—Mich.—Wyo.—Calif.—N.M. *Submont.* My-Je.

5. *C. succulenta* Schrad. A small tree, 4-7.5 m. high, with ascending branches; branches glabrous or hairy; spines numerous, 3-10 cm. long; leaves rhombic-ovate to obovate, 3-9 cm. long, acute at the apex, broadly cuneate at base, doubly serrate, dark green and shining above; corymb slightly villous; sepals lanceolate, acuminate, glandular-laciniate, villous; stamens 10-20; anthers pink, rarely yellow or white; fruit dark red, villous, about 1 cm. thick. *C. macrantha* (Lindl.) Lodd. *C. occidentalis* Britton. *C. coloradensis* A. Nels. *C. Colorado* Ashe and *C. coloratoides* Ramaley, the variety with hairy twigs. Hillsides and cañons: N.S.—N.C.—Colo.—Sask. *Plain—Submont.* My-Je.

6. *C. chrysocarpa* Ashe. A round-topped shrub or tree, 2-7 m. high; spines 2-7 cm. long, numerous; leaves orbicular or rounded-obovate, 3-5 cm. long, acute at the apex, broadly cuneate at the base, with 3 or 4 pairs of triangular lobes and doubly serrate; sepals lanceolate, acuminate, glandular-margined; stamens 5-10; fruit depressed-globose, about 1 cm. thick, red. *Crataegus rotundifolia* (Ehrh.) Borkh., not Lam. *C. Sheridanii* A. Nels. *C. Doddsii* Ramaley, a form with glandular petioles and dark fruit. Cañons and banks: N.B.—N.C.—N.M.—Wyo.—Sask. *Plain—Submont.* My, fr. Au-S.

7. *C. Williamsii* Eggleston. A round-topped shrub or tree, 4 m. high; spines 3-6 cm. long; leaf-blades ovate or oval, 4-9 cm. long, acute or rarely

acuminate at the apex, cuneate at the base, with 2-4 shallow lobes towards the apex, serrate, with gland-tipped teeth, slightly pubescent above and at the junctions of the veins beneath; corymb pilose; sepals pubescent within, ovate, acuminate, sometimes with stalked glands; stamens 10; styles 3 or 4; fruit globose, 8-10 mm. thick, red, slightly pubescent. Banks: nw Mont. *Submont.* My-Jl.

8. *C. columbiana* Howell. A shrub or small tree, much branched; leaves rather thin, obovate or ovate, 2-6 cm. long, cuneate at the base, with 3 or 4 pairs of sharp lobes, sharply and doubly toothed, sparingly long-hairy, especially along the veins; corymb sparingly long-hairy; sepals triangular, long-pointed, slightly long-hairy within, glandular-toothed; stamens about 10; fruit pear-shaped or ellipsoid, 8-12 mm. long, scarlet. *C. Piperi* Britton, a form with hairy corymb and fruit. River banks: B.C.—N.D.—Ida.—Ore. *Submont.*

FAMILY 62. AMYGDALACEAE. PLUM FAMILY.

Trees or shrubs, with alternate simple leaves and deciduous stipules. Flowers perfect, in ours regular. Hypanthium well developed, mostly cup-shaped, with an angular disk at the mouth bearing the stamens. Sepals and petals 5. Stamens in ours 10 or more. Pistils usually solitary. Fruit a drupe.

Drupe with pulpy exocarp; leaves not fascicled.

Drupe with almost dry exocarp, pubescent; leaves fascicled.

1. PRUNUS

2. EMPLECTOCLADUS.

1. PRUNUS L. PLUMS, CHERRIES.

Shrubs or trees. Leaves alternate, deciduous, usually toothed. Flowers perfect, either solitary, umbellate or corymbose from scaly buds, or corymbose or racemose at the ends of leafy branches. Hypanthium in ours campanulate or turbinate. Sepals 5, imbricate. Petals 5, imbricate, inserted with the stamens on a disc in the throat of the hypanthium. Stamens 15-30; filaments filiform, distinct. Drupe, with a fleshy (exocarp) often with a bloom; stone bony, smooth.

Flowers few, umbellate or corymbose

Fruit with a ventral groove and flat stone (PLUMS.)

Leaves oval or orbicular, rounded at the apex

Leaves lanceolate to obovate, acute or acuminate

Trees or shrubs, usually spiny, leaves serrate to near the base

Low undershrub, unarmed, leaves entire at the base

Fruit without a ventral groove, stone subglobose (CHERRIES.)

Creeping shrub; flowers umbellate.

Erect shrubs or trees

Hypanthium decidedly obconic; flowers umbellate from naked lateral buds

Hypanthium campanulate or turbinate, flowers more or less corymbose.

Leaves acute, serrate.

Corymbs naked.

Corymb usually subtended by 1 or 2 leaves

Leaves obtuse or rounded at the apex, crenulate.

Leaves glabrous

Leaves pubescent.

Flowers many, racemose on leafy branches (CHOKE CHERRIES)

Leaves more or less pubescent beneath

Peduncles stout; pedicels pubescent, shorter than the fruit, deciduous; leaves thick

Peduncles slender; pedicels glabrous, longer than the fruit, persistent; leaves

rather thin.

Leaves glabrous on both sides.

1. *P. subcordata*.

2. *P. americana*.

3. *P. prunella*

4. *P. Besseyi*.

5. *P. ignota*.

6. *P. pennsylvanica*.

7. *P. corymbulosa*

8. *P. emarginata*.

9. *P. prunifolia*.

10. *P. valid*.

11. *P. demissa*

12. *P. melanocarpa*.

1. *P. subcordata* Benth. Tree up to 8 m. high, with stout spreading branches, finely pubescent, becoming glabrous; leaves oval to orbicular, 2.5-7 cm. long, finely double-toothed, pale beneath; sepals entire, rounded; fruit 2-3 cm. long, dark red or yellow. Rocky hills: Ore.—Ida.—Calif. *Submont.* Mr-My.

2. *P. americana* Marsh. Tree 5-11 m. high, or rarely a shrub 1-5 m., more or less spiny, with glabrous twigs; leaves firm, lanceolate, elliptic, or obovate, 4-10 cm. long, acute or rounded at the base, acuminate at the apex, sharply toothed, glabrous, or somewhat hairy along the veins beneath; fruit subglobose or round-ellipsoid, 2-2.5 cm. long, orange, bright red, or purplish. Along rivers and in thickets: N.Y.—Fla.—Tex.—Colo.—Mont. *Plain—Submont.* Mr—My.

3. *P. prunella* Daniels. Undershrub, thornless, trailing or ascending, 3-6 dm. high; twigs reddish; leaves lanceolate, 3-5 cm. long, sharply serrate, except the entire acuminate base, glossy green above, paler beneath; fruit ellipsoid, 1.3-1.5 cm. long and 1 cm. thick, black-purple, with a slight bloom. Table land: Colo. *Submont.*

4. *P. Besseyi* Bailey. Shrub, with spreading or prostrate branches, 0.5-1.5 m. long; leaves oblanceolate or elliptic, cuneate at the base, acute at the apex, serrate, flowers in sessile umbels, opening with the leaves; fruit 12-16 mm. in diameter, globose, black, often mottled, somewhat astringent. Sand hills: Man.—Minn.—Kans.—Colo.—Wyo. *Plain.* My—Je.

5. *P. ignota* A. Nels. "Shrubby or possibly becoming tree-like; branches slender, none of them becoming indurated or thorny; leaves glabrous from the first, simply and sharply serrate; flowers white [or pinkish], appearing with or after the leaves, solitary or 2 or 3 in a cluster; calyx [hypanthium] turbinate; lobes entire, glabrous within and nearly so without; petals obovate." [Perhaps one of the cultivated Japanese cherries, escaped, but species not identified.] Banks: Colo. *Plain.* My.

6. *P. pennsylvanica* L. f. A small tree, or shrub, sometimes 12 m. high; leaves oval to lanceolate, acute or acuminate at the apex, rounded or acute at the base, glabrous and shining on both sides, serrulate; inflorescence corymbose, leafless, peduncled or sessile, unfolding with the leaves; fruit globose, red, 4-6 mm. in diameter, sour. Rocky woods and along streams: Newf.—Ga.—Colo.—N.D. *Plain—Submont.* Ap—Je.

7. *P. corymbulosa* Rydb. A small shrub, 1-2 m. high; leaves glabrous and shining, 4-6 cm. long, ovate-lanceolate, acute or acuminate, finely serrulate; corymbs 3-6-flowered, peduncled, usually subtended by 1 or 2 small leaves; sepals erose; petals more or less pubescent; fruit globose, red. *Cerasus trichopetala* Greene. Hills: Mont.—Wyo. *Submont.* My—Je.

8. *P. emarginata* (Dougl.) Walp. A tree up to 8 m. high, with glabrous, red, shining branches; leaves elliptic, obovate, or oblanceolate, 3-8 cm. long, rounded or obtuse at the apex, crenate, with gland-tipped teeth, dark green above, paler beneath; sepals rounded at the apex, entire; petals obovate, greenish white; fruit 8-12 mm. in diameter, dark red or almost black to lemon-yellow. *Cerasus padifolia* Greene. Hillsides: B.C.—Ida.—Nev.—Calif. *Submont.* Ap—Je.

9. *P. prunifolia* (Greene) Shafer. A tree rarely 15 m. high, with grayish brown branches, at first finely pubescent, in age glabrous; leaves elliptic or obovate, or rarely oval, 4-9 cm. long, rounded or obtuse, or on vigorous shoots acute at the apex, crenate, with gland-tipped teeth, dark green above, paler and villous beneath; sepals blunt, villous; petals white, obovate; fruit 8-12 mm. in diameter, bright red or purple. *Cerasus mollis* Dougl. *C. prunifolia* Greene. *P. mollis* Walp., not Torr. Hills and copses: B.C.—Ida.—Ariz.—Calif. *Submont.* Ap—Je.

10. *P. valida* (Woot. & Standl.) Rydb. Tree 5-8 m. high; branches stout, dark reddish brown, densely and finely pubescent when young; leaf-blades obovate, oval, or elliptic, 5-7 cm. long, rounded or subcordate at base, green and glabrous above, glaucescent and pubescent beneath, serrulate with inflexed teeth; peduncle stout, pubescent, often recurved above; fruit black, 10-12 mm. thick. *Padus valida* Woot. & Standl. Canons: N.M.—see Utah. *Submont.* Je.

11. *P. demissa* (Nutt.) Walp. Tree up to 15 m. high; twigs densely pubescent when young; leaves obovate or oblong-obovate, 5-10 cm. long, rounded or subcordate at the base, sharply toothed, paler and pubescent at least on the veins beneath; peduncles 7-10 cm. long, more or less pubescent; petals about 5

mm. long; fruit globose, 8-10 mm. in diameter, purplish or red. *Cerasus demissa* Nutt. River banks: B.C.—Ida.—Calif.; apparently also Black Hills of S. D., but there a mere low shrub (f. *Rydbergii* Koehne). *Submont.* My-Je.

> **12. *P. melanocarpa*** (A. Nels.) Rydb. Tree or shrub up to 10 m. high; twigs reddish brown, glabrous; leaves obovate or oval, abruptly acuminate at the apex, mostly rounded at the base, rather firm, paler beneath, glabrous on both sides; peduncles slender, glabrous or rarely minutely puberulent, many-flowered; petals about 6 mm. long; fruit dark purple or black, 6-8 mm. thick, sweet, slightly astringent, shorter than the pedicels. *Cerasus demissa melanocarpa* A. Nels. Hills and river banks: Alta.—N.D.—Kans.—N.M.—Calif.—B.C. *Plain—Submont.* My-Je.

2. EMPECTOCLADUS Torr. WILD ALMONDS.

Low shrubs, with divaricate, spinescent branches. Leaves fasciculate on short branchlets, entire. Flowers 1-3, in axillary umbels, perfect. Hypanthium campanulate, hairy within. Sepals and petals 5, imbricate. Stamens 10-15; filaments slender, distinct. Drupe pubescent, with rather dry exocarp, which splits on one side. Stone bony, flattened.

1. *E. fasciculatus* Torr. A shrub 0.5-1 m. high, with divaricate branches, more or less spinescent; leaves fascicled on short branchlets, spatulate, nearly sessile, 5-10 mm. long, finely puberulent or glabrate; flowers sessile or nearly so; petals linear-oblongate, white, 3 mm. long; stamens 10-15; fruit subglobose, pubescent, about 1 cm. long. *Prunus fasciculata* A. Gray. *Amygdalus fasciculatus* Greene. Desert regions: Calif.—s Utah—Ariz. *L. Son.* Mr-Apr.

FAMILY 63. MIMOSACEAE. MIMOSA FAMILY. •

Herbs, shrubs, or trees, usually with twice or thrice pinnately compound leaves, with stipules, the latter often modified into spines. Flowers mostly perfect, regular, in heads or spikes. Sepals 3-6, partly united, valvate. Petals as many, valvate, distinct or partly united. Stamens of the same number, twice as many, or numerous. Pistil solitary, in fruit becoming a legume.

Legumes flat; valves not separating from the continuous margins.
Legumes 4-angled; valves separating from the continuous margins.

1. ACUAN
2. MORONGIA

1. ACUAN Medic. PRAIRIE MIMOSA.

Perennial unarmed herbs, rarely somewhat shrubby. Leaves bipinnate, with numerous leaflets. Flowers in peduncled heads or head-like spikes, perfect or the lower ones staminate, sometimes without petals. Calyx 5-lobed. Petals 5, distinct, or slightly united at the base. Stamens 5 or 10, exserted; filaments distinct or nearly so. Ovules numerous. Pod elongate, unarmed. [*Desmanthus* Willd.]

1. *illinoensis* (Michx.) Kuntze. Erect or ascending herb, 3-10 dm. high, glabrous or nearly so; leaves bipinnate, with 20-30 pinnae; leaflets numerous, linear-oblong, 2.5-3.5 mm. long; peduncles 2.5-8 cm. long, longer than the pods; stamens 5; pods 4-6 mm. wide, in compact heads, slightly spirally twisted. *Desmanthus brachylobus* (Willd.) Benth. River banks: Tenn.—Fla.—Tex.—N.M.—S.D. *Plain.* My-Je.

2. MORONGIA Britton. SENSITIVE BRIER.

Perennial herbs or shrubs, with spreading prickly stems. Leaves bipinnate, usually sensitive; leaflets numerous, usually small. Flowers perfect or polygamous, in axillary peduncled heads. Calyx 4- or 5-lobed. Petals 4 or 5, united to about the middle. Stamens 8-10, exserted; filaments distinct or nearly so. Ovules numerous. Pod narrow, 4-angled, prickly all over, finally 4-valved, the valves separating from the margins. [*Schrankia* Willd., not Medic.]

1. **M. uncinata** (Willd.) Britton. Herbs; stem 3–15 dm. long, armed with recurved prickles; leaves bipinnate; pinnæ 6–12; leaflets numerous, oblong, 3–6 mm. long, apiculate, prominently veined beneath; peduncles prickly; pod 3–15 cm. long, more or less densely prickly, beaked. *Schrankia uncinata* Willd. Prairies and dry soil: Va.—Fla.—Tex.—Colo. *Plain.* Je-S.

FAMILY 64. CAESALPINIACEAE. SENNA FAMILY.

Trees, shrubs or herbs. Leaves alternate, usually with stipules, simple or compound. Flowers mostly perfect, regular or irregular. Calyx of 5, more or less united sepals. Petals usually 5, imbricate, the upper one enclosed by the lateral ones in the bud. Stamens 10 or fewer, filaments distinct or monadelphous. Ovary 1-celled. Fruit a 2-valved legume or indehiscent.

Leaves bipinnate; anthers opening lengthwise.

Leaves simply pinnate; anthers opening by terminal pores.

1. **HOFFMANSEGGIA**.

2. **CHAMAECRISTA**.

1. **HOFFMANSEGGIA** Cav.

Herbs, sometimes somewhat woody at the base. Leaves bipinnate; leaflets several to many, often glandular-punctate. Flowers perfect, racemose. Calyx-lobes equalling or exceeding the tube. Petals 5, yellow or yellowish, imbricate. Stamens 10, slightly declined; filaments distinct, glandular at the base; anthers opening lengthwise. Pod flat, often more or less curved, few-seeded.

Leaves, flowers, and pods with black glandular dots; pod short, straight on the back or nearly so.

1. *H. Jamesii*.

Leaves, flowers, and pods without glandular dots.

Pod about 7 mm. wide, strongly arcuate.

2. *H. depranocarpa*.

Pod 12–14 mm. wide, straight or nearly so.

3. *H. repens*.

1. **H. Jamesii** T. & G. Herb, with fusiform root; stem branched at the woody base, 1–3.5 dm. high, finely pubescent and more or less glandular; leaves with 5–7 pinnæ, each bearing 10–20 leaflets, which are oblong or oblong-ovate, 3–5 mm. long, obtuse; calyx-lobes oblong or linear-oblong, 7–9 mm. long; petals about 1 cm. long, clawed; pod 2.25 cm. long. Plains: Kans.—Tex.—Ariz.—Colo. *Son.* My–Au.

2. **H. depranocarpa** A. Gray. Herb, perennial, with a thick root; stem branched, 1–2 dm. high, puberulent; leaves with 5–11 pinnæ, each with 8–20 leaflets; these sub-falcate, nerveless, crowded; petals obovate, glandless, about 1 cm. long; pod 3–4 cm. long, 9–10-seeded, glabrous or minutely puberulent. Plains: N.M.—Colo.—Ariz. *Son.* Je–Au.

3. **H. repens** (Eastw.) Cockerell. Perennial, with a woody rootstock, 1–1.5 dm. high, canescent; leaves with 5–7 pinnæ, each with 4–6 leaflets, which are obovate, 5–7 mm. long, strigose; lower sepal oblanceolate, the rest lanceolate; petals obovate, short-clawed, 8–12 mm. long; filaments hairy below, but not glandular; pod flat, broad, oblong or elliptic, rarely suborbicular. *Caesalpinia repens* Eastw. Bluffs and washes: Utah. *Son.* My.

2. **CHAMAECRISTA** Moench. PARTRIDGE PEA, SENSITIVE PEA, WILD SENSITIVE PLANT.

Herbs or shrubs. Leaves pinnate; rachis with 1 or 2 glands at the base. Flowers solitary or clustered, axillary or supra-axillary; pedicels twisted. Calyx 5-lobed. Corolla irregular; petals 5, one of the lateral ones (banner) and the lower one (one of the wings) larger than the rest. Stamens 10, all perfect or some of them reduced to staminodia; anthers unequal in size, opening by terminal pores. Pod linear, flat, dehiscent with elastic valves.

1. **C. fasciculata** (Michx.) Greene. Erect herb; stem glabrous, 3–6 dm. high, glabrous; leaflets 16–28, oblong-elliptic, about 1.5 cm. long, 3 mm. wide; petiolar gland sessile; peduncles supra-axillary, 3–5-flowered; sepals lanceolate, fully equalling the petals; pods linear, pubescent, 5 cm. long, 5 mm. wide. *Cassia chamaecrista* Am. auth. Meadows: Me.—Fla.—Mex.—Colo.—Minn. *Plain.* Je-S.

FAMILY 65. **FABACEAE.** PEA FAMILY.

Herbs, shrubs, or trees, with alternate, mostly pinnately or palmately compound leaves with stipules. Flowers perfect, rarely polygamo-dioecious, irregular, zygomorphic. Calyx of 5, or rarely 4, more or less united sepals, or sometimes by the complete union of some of the sepals becoming 2-lipped. Corolla papilionaceous, *i. e.*, consisting of 5 more or less united or distinct petals, of which the upper (banner or standard) is broader and surrounds the rest, the 2 lateral ones (wings) are curved upwards, and the 2 lowest (keel) more or less united, forming a boat-shaped organ. Stamens usually 10, sometimes 9 or 5; filaments diadelphous (9 and 1), monadelphous, or rarely distinct. Pistil 1, superior. Fruit a 2-valved or indehiscent legume, 1-celled or by the intrusion of the sutures 2-celled, or a loment, *i. e.*, divided by false cross-partitions into several cells.

Filaments distinct.

Leaves pinnate

Leaves digitately 3-foliate

Filaments monadelphous or diadelphous.

Rachis of the leaves not produced into a tendril or bristle-like appendage, representing the terminal leaflet.

Fruit 2-valved or indehiscent, not a loment.

Foliage not glandular-dotted.

Anthers of 2 kinds; filaments monadelphous, leaves digitate, calyx 2-lipped

Anthers all alike; filaments diadelphous; calyx 5-toothed.

Leaflets toothed

Leaflets not toothed.

Filaments all or at least 5 of them (alternately) dilated above, flowers umbellate, or solitary

Filaments all filiform, flowers racemose or capitate

Herbs, shrubs, or trees; keel of the corolla neither curved nor collid.

Herbaceous vines; keel of the corolla in ours collid or at least curved.

Filaments all filiform; leaves odd-pinnate, flowers racemose or capitate

Foliage glandular-dotted.

Pod prickly.

Pod not prickly.

Fruit a loment, *i. e.*, breaking up transversely into 1-seeded indehiscent reticulate internodes.

Rachis of the leaves produced into a tendril or bristle-like appendage.

Tribe I. SOPHOREAE.

Tribe II. PODALYRIEAE.

Tribe III. GENISTEAE.

Tribe IV. TRIFOLIEAE.

Tribe V. LOTEAE.

Tribe VII. GALEGEAE.

Tribe XI. PHASEOLEAE.

Tribe VII. GALEGEAE.

Tribe VIII. GLYCYRRHIZEAE.

Tribe VI. PSORALEAE.

Tribe IX. HEDYSAREAE.

Tribe X. VICIEAE.

TRIBE I. SOPHOREAE.

One genus.

1 SOPHORA.

TRIBE II. PODALYRIEAE.

One genus.

2 THERMOPSIS.

TRIBE III. GENISTEAE.

One genus.

3. LUPINUS.

TRIBE IV. TRIFOLIEAE.

Leaves digitate, in most 3-foliate.

Leaves pinnately 3-foliate.

Pod curved or collid.

Pod straight.

4. TRIFOLIUM.

5. MEDICAGO.

6. MELILOTUS.

TRIBE V. LOTEAE.

Keel prolonged into an incurved beak; leaves odd-pinnate.

Stipules foliaceous; flowers in umbels

Stipules gland-like; flowers mostly solitary.

Keel blunt, not beaked.

Legumes straight or nearly so, acute, dehiscent.

Stipules foliaceous; leaves regularly odd-pinnate.

Stipules gland-like, leaves irregularly even-pinnate.

Legumes curved, indehiscent, caudate-acuminate.

7. LOTUS.

8. ACRISPON.

9. HOSACKIA.

10. ANISOLOTUS.

11. SYRMAIUM.

TRIBE VI. PSORALEAE.

Petal 1 (standard); leaves odd-pinnate.

Petals 5.

Wings and keel free from the filament-tube; ovules solitary; leaves digitate.

12. AMORPHA.

13. PSORALEA.

Wings and keel more or less adnate to the filament-tube; ovules 2-6; leaves odd-pinnate.

Stamens 9 or 10.

Stamens 5.

14. PAROSELA.

15. PETALOSTEMON.

TRIBE VII. GALEGEAE.

Leaflets with stipels; pods margined on one edge; trees or shrubs.

16. ROBINIA

Leaflets without stipels; pods not margined; herbs or undershrubs.

17. PETERIA.

Stipules modified into spines

Stipules not modified into spines.

Keel (lower petal) not produced into a beak.

Leaves odd-pinnate, or unifoliate or simple.

Pods papery, strongly inflated.

Pods strictly 1-celled.

Pods 2-celled.

18. PHACA

Pods terete or nearly so.

19. CYSTIUM.

Pods sharply 3-angled in cross-section.

20. ONIX.

Pods coriaceous or chartaceous, if thin-walled, not inflated.

Pods 2-celled with a perfect or nearly perfect partition.

Pods fleshy, indehiscent or very tardily dehiscent.

21. GEOPRUMNON

Pods membranous, leathery or woody, dehiscent.

Pods ovoid or oblong, rarely almost didymous, terete or vertically

flattened, leathery or woody.

22. ASTRAGALUS.

Pods linear, somewhat laterally flattened, membranous.

23. HAMOSA.

Pods 1-celled, the partition, if any, rudimentary.

Lower suture strongly intruded, making the pod sagittate or obcordate in cross-section; pod membranous, rarely leathery.

24. TIUM.

Lower suture not intruded or merely slightly so; pods in the latter case woody.

Pods woody or chartaceous, never flattened laterally; both sutures not prominent

Pods more or less stipitate.

Pods with two grooves on the upper side, strictly 1-celled.

25. DIHOLCOS.

Pods without grooves on the upper side, usually with a partial partition.

Leaves unifoliate.

26. JONESIELLA.

Leaves odd-pinnate.

27. RYDBERGIELLA

Pods sessile, usually without even a rudimentary partition.

Valves of the pods not winged

Pods with a fleshy epicarp, in fruit cross-ribbed; leaflets obscurely articulated to the rachis, fleshy, narrow.

28. CTENOPHYLLUM.

Pods without fleshy epicarp; leaflets distinctly articulated to the rachis

Calyx cylindrical; flowers large; plant mostly low and caespitose

30. XYLOPHACOS.

Calyx campanulate; flowers small.

Corolla yellow, calyx-lobes linear-lanceolate, equalling the tube, stipules united; stem low.

29. CNEMIDOPHACOS.

Corolla purple; calyx-lobes triangular, much shorter than the tube; stipules free or nearly so, stem tall and slender.

31. MICROPHACOS.

Valves of the pods winged

32. PTEROPHACOS.

Pods membranous, usually somewhat flattened laterally, if terete, both sutures prominent.

Partial partition present.

33. ATELEPHRAGMA.

Partial partition wanting.

Leaflets not spinulose-tipped; pods several-seeded.

34. HOMALOBUS.

Leaflets spinulose-tipped; pods 1-2-seeded.

35. KENTROPHYTTA.

Leaves digitately 3-foliate.

Flowers racemose.

Flowers capitate (some species of).

36. OREOPHACA.

4. TRIPOLIUM

Keel (lower petals) produced into a beak.

37. ARAGALLUS.

TRIBE VII. GLYCYRRHIZEAE.

One genus.

38. GLYCYRRHIZA.

TRIBE IX. HEDYSARIEAE.

Leaves odd-pinnate, with several pairs of leaflets, without stipels.

Pods 4-several-seeded, neither spiny nor dorsally toothed.

Pods 1-2-seeded, more or less spiny or toothed.

Leaves 3-foliate, with stipels.

39. HEDYSARUM.

40. ONOBYCHIS.

41. MELBOMIA.

TRIBE X. VICIEAE.

Style filiform, hairy all around and below the apex; stamen-tube usually oblique at the summit.

Style flattened towards the apex, hairy on the inner side; stamen-tube usually truncate or nearly so.

42. *VICIA*.43. *LATHYRUS*.

TRIBE XI. PHASEOLEAE.

Leaves 5-7-foliolate; style glabrous.

Leaves 3-foliolate; style bearded along the inner side.

44. *APIOS*.45. *STROPHOSTYLES*.1. *SOPHORA* L.

Trees or shrubs, or (ours) perennial herbs, with rootstocks. Leaves odd-pinnate, with bristle-like stipules. Flowers perfect, in racemes. Calyx campanulate, 5-lobed. Petals clawed, white, yellow, or violet, nearly equal in length; banner suborbicular, notched at the apex; keel 2-beaked at the apex. Stamens 10; filaments distinct or nearly so. Pod nearly terete, usually moniliform, indehiscent or tardily dehiscent. Seeds globose.

1. *S. sericea* Nutt. Perennial, with a creeping rootstock; stem 1-3 dm. high, silky-canescens, leafy; leaflets 15-23, elliptic or obovate, canescent; calyx gibbous on the upper side; lobes lanceolate to triangular; corolla about 15 mm. long, ochroleucous; keel with two subulate beaks; pod 3-5 cm. long, constricted between the seeds. Dry prairies, plains, and hills: S.D.—Tex.—Ariz.—Wyo. Plain—Submont. Ap-Je.

2. *THERMOPSIS* R. Br. YELLOW PEA, GOLDEN PEA, PRAIRIE BEAN.

Perennial herbs, with creeping rootstocks. Leaves alternate, with foliaceous stipules, digitately 3-foliolate, with entire leaflets. Flowers perfect, in racemes. Calyx campanulate, 5-lobed, the lobes nearly equal, or the upper two united. Corolla in ours yellow; banner with a broad spreading blade and reflexed margins; keel as long as the wings or longer. Stamens 10, distinct; anthers nearly alike. Pod narrow, flat, 2-valved, many-seeded.

Legume erect or ascending.

Fruit straight

Legume strictly erect and appressed to the peduncle, densely pubescent.

Leaves strongly ascending; leaflets lance-oblong or oblanceolate; stipules lanceolate or oblong, more than twice as long as broad, raceme dense.

Leaves spreading; leaflets rhombic-elliptic to elliptic-oblong; lower stipules at least ovate, very oblique, less than twice as long as broad.

Raceme lax; legume straight.

Raceme dense; legume somewhat curved.

Legume ascending, sparingly pubescent; stipules broad; raceme few-flowered

Fruit arcuate with spreading tips

Legume 4-6 cm. long

Legume 8-10 cm. long.

Legume strongly divaricate or reflexed; inflorescence short.

Fruit mostly horizontal, merely arcuate

Fruit reflexed, curved into half a circle or more.

Leaves glabrous above

Leaves silvery on both sides.

1. *T. montana*.2. *T. ovata*4. *T. xylorrhiza*3. *T. pinetorum*4. *T. xylorrhiza*5. *T. divaricata*6. *T. arenosa*.7. *T. rhombifolia*8. *T. annulocarpa*.

1. *T. montana* Nutt. Stem 3-6 dm. high, slightly angled, glabrous or sparingly hairy; leaflets 3-6 cm. long, glabrous above, sparsely pubescent beneath; inflorescence rather dense, 1-1.5 dm. long; corolla 15-20 mm. long; pod linear, 4-6 cm. long, 5 mm. wide. *T. stricta* Greene. Meadows: Mont.—Colo.—Utah—Ore.—Wash. Submont.—Mont. My-Jl.

2. *T. ovata* (B. L. Robins.) Rydb. Stem 3-7 dm. high, strict, branched above; leaflets rhombic-elliptic or elliptic-oblong, 6-10 cm. long, glabrous, racemes 1-2 dm. long; corolla 2-2.5 cm. long; pod straight, about 6 cm. long, sparingly villous. *T. montana ovata* B. L. Robins. Valleys: Wash.—Ida.—Utah. Submont. Ap-Je.

3. *T. pinetorum* Greene. Stem 2-4 dm. high, striate, glabrous or sparingly pubescent above; stipules ovate, 2-4 cm. long; leaflets oblong or obovate-oblong, 3-5 cm. long, obtusish, glabrous above, sparingly pubescent beneath; racemes short, 3-5 cm. long; fruit linear, 5-7 cm. long, 6 mm. wide, appressed-

pubescent, straight, about 10-seeded. In woods: Colo.—Utah—N.M. *Submont.*—*Mont.* Je-Jl.

4. **T. xylorrhiza** A. Nels. Stem erect, 4-7 dm. high, glabrate and striate; stipules ovate or obovate, 2-4 cm. long; leaflets oval or elliptic, 4-8 cm. long; raceme 10-20-flowered, dense; pod sparingly pubescent, somewhat arcuate, 4-6 cm. long. Shady slopes. Ida. *Mont.*

5. **T. divaricarpa** A. Nels. Stem erect, 5-8 dm. high; stipules large, ovate, or on the branches narrower, 2-5 cm. long; leaflets rhombic-oblancoelate or elliptic, glabrous above, pubescent beneath, 5-10 cm. long; corolla fully 2 cm. long; pod linear; finely pubescent, about 15-seeded. Creek banks and open slopes: Wyo.—Colo. *Submont.*—*Subalp.* Je-Jl.

6. **T. arenosa** A. Nels. Stems several, 2-4 dm. high, glabrous or slightly pubescent above; stipules ovate to suborbicular, 2-4 cm. long; leaflets oblong, oblanceolate, or obovate, 3-4 cm. long, glabrous on both sides, or sparingly hairy beneath; pod spreading, 4-7 cm. long, more or less torulose, 8-13-seeded. Sandy or gravelly places: Sask.—Colo.—*Mont.* *Plain*—*Mont.*

7. **T. rhombifolia** (Nutt.) Richards. Stems several, glabrous or strigose above, 1-3 dm. high; stipules ovate to suborbicular, 1-2 cm. long, often obtuse; leaflets rhombic-obovate to oblong-oblancoelate, 2-3 cm. long; corolla 15-20 mm. long; pod 5-6 cm. long, grayish strigose, 10-13-seeded. Sandy places, especially in draws: Sask.—Neb.—Colo.—*Mont.* *Plain*—*Submont.* Ap-Je.

8. **T. annulocarpa** A. Nels. Stems single or two, 2-4 dm. high, strigose; stipules broadly ovate or rhombic, 2-3 cm. long, leaflets elliptic, oblong or broadly oblanceolate, mostly obtuse, 3-5 cm. long; pod often forming a nearly complete ring, 7-10 cm. long, strigose-canescens, 7-12-seeded. Among rocks: Wyo. *Mont.* Je.

3. LUPINUS (Tourn.) L. LUPINE, WOLF'S BEAN, BLUE BONNET, QUAKER BONNET.

Annual or perennial herbs, or rarely shrubs. Leaves alternate, with narrow stipules, digitately 5-15-foliate, rarely 1- or 3-foliate. Flowers perfect, in terminal racemes. Calyx 2-lipped, the upper lip of 2 partially, and the lower of 3 partially or usually wholly united sepals. Corolla in most of our species blue, purple, or white, in a few yellow; banner broad, with reflexed margins; wings curved, keel sickle-shaped. Stamens monadelphous; anthers alternately larger and smaller. Pods flat, 2-valved, dehiscent; ovules and seeds 2-many.

Perennials with rootstocks; cotyledons petioled after germination.

Plant tall, 3 dm. high or more.

Stem with appressed hairs

Leaves glabrous above, at least in age.

Flowers large, over 12 mm. long.

Stem rather low and stout, canescent-strigose, leaflets broadly oblanceolate

Stem glabrous or almost so, tall, leaflets narrowly oblanceolate.

Flowers small, less than 12 mm. long.

Leaves permanently pubescent above

Flowers yellow or ochroleucous.

Flowers blue, purple, or white

Calyx produced backwards into a distinct spur or sack.

Spur of the calyx 2-3 mm. long

Spur of the calyx 1 mm. long or less.

Calyx merely gibbous at the base, not produced backwards

Plant green, usually not densely hairy, pubescence short, or if

longer, very sparse.

Keel moderately curved, lunate, the upper portion longer than

the lower.

Keel strongly curved, the upper portion shorter than the lower.

Plant densely silvery or canescent with long hairs.

Stem leafy; pubescence of the leaves appressed.

Stem leafy at the base only, pubescence of the leaves longer and

looser.

Stem with spreading pubescence.

I. PLATTENSES.

X. POLYPHYLLI.

II. PARVIFLORI.

V. SULPHUREI.

III. CALCARATI.

IV. ARGOPHYLLI.

VI. ALBICAULES.

VII. FOLIOSI.

VIII. ORNATI.

XIV. LEPIDI.

- Leaflets glabrous above, at least in age; flowers large.
 Bracts linear-subulate, long-attenuate, almost setaceous, much exceeding the flower-buds IX. CYTISOIDES.
 Bracts lanceolate, scarcely exceeding the flower-buds X. POLYPHYLLI.
 Stem tall, leafy throughout, leaflets narrowly oblanceolate, acute XI. AMNOPHILI.
 Stem low, stout, leafy mostly towards the base; leaflets broadly oblanceolate or spatulate, mucronate. XII. CYANEI.
 Leaflets permanently pubescent above XIII. LEUCOPHYLLI.
 Pubescence of the stem of one kind, usually short, except in *L. comatus*.
 Pubescence of the stem of two kinds, viz., a short and dense under-pubescence and scattered long silky hairs.
 Plant low, less than 3 dm. high, densely resplendous.
 Inflorescence much exceeding the leaves XIV. LEPIDI.
 Leaves mostly basal; petioles many times longer than the leaflets XV. CANDICANTES.
 Leaves mostly cauline; petioles of the cauline leaves only slightly, if at all, exceeding the leaflets in length. XVI. MONTICOLAE.
 Leaves densely canescent. XVII. CAESPITOSI.
 Leaves green XVIII. CONCINI.
 Inflorescence not exceeding the leaves. XIX. PUSILLI.
- Annuals
 Cotyledons after germination petioled; pods 3-4-seeded.
 Cotyledons after germination sessile, persistent, clasping the stem, pod 2-seeded.

I. PLATTENSES.

One species

1. *L. plattensis*

II. PARVIFLOHI

- Calyx spurred or saccate at the base, appressed-silky, banner pubescent on the back; keel ciliate
 Leaflets oblanceolate, flat; racemes comparatively dense, flowers numerous, subverticillate. 2. *L. pseudoparviflorus*.
 Leaflets linear, conduplicate, flowers scattered in a lax raceme. 3. *L. stenophyllus*.
 Calyx somewhat gibbous at the base, but not produced backwards into a spur or sack
 Inflorescence, pedicels, and calyces finely white-silky with strictly appressed hairs
 Flowers 15 mm. long, corolla white 4. *L. leucanthus*.
 Flowers 12 mm. long or less; corolla purple or blue
 Banner somewhat silky on the back, lower lip of the calyx twice as long as the upper, keel ciliate on the margins 5. *L. Scheuberae*.
 Banner glabrous, keel not ciliate
 Lower lip of the calyx only slightly longer than the upper; flowers about 10 mm. long; plant green 6. *L. laxispicus*.
 Lower lip of the calyx much longer than the upper, corolla about 8 mm. long, plant silvery 7. *L. tenellus*.
 Inflorescence, pedicels, and calyces more loosely pubescent, hairs at least in ages spreading.
 Flowers middle-sized, 8-12 mm. long
 Banner pubescent on the back, plant silvery 8. *L. argenteus*.
 Banner glabrous, plant green
 Calyx strongly gibbous at the base, keel glabrous; stem purplish. 9. *L. rubricaulis*.
 Calyx not strongly gibbous; stem green
 Banner blue or purplish, not dark-spotted
 Lower lip of the calyx about twice as long as the upper, leaves broadly oblanceolate 10. *L. spathulatus*.
 Lower lip of the calyx only slightly longer than the upper, leaflets narrowly oblanceolate. 11. *L. alpestris*.
 Banner light blue with a dark spot. 12. *L. maculatus*.
 Flowers about 6 mm. long
 Leaflets narrowly oblanceolate
 Lips of the calyx acutely 2- and 3-toothed 13. *L. floribundus*.
 Lips of the calyx obtuse, merely retuse. 14. *L. leptostachyus*.
 Leaflets broadly oblanceolate. 15. *L. parviflorus*.

III. CALCARATI.

One species

16. *L. calcaratus*

IV. ARGOPHYLLI.

- Lower lip of the calyx about half longer than the upper, leaflets linear-oblanceolate
 Petals and calyx-lobes narrow; wings fully twice as long as broad, lower lip of calyx narrowly lanceolate, plant greener, inflorescence lax 17. *L. laxiflorus*.
 Petals and calyx-lobes broad, lower lip of the calyx broadly lanceolate, plant silvery white; inflorescence dense 18. *L. aduncus*.
 Lower lip of the calyx about twice as long as the upper; leaflets broadly lanceolate
 Leaflets equally silvery white on both sides, usually conduplicate, their backs usually curved. 19. *L. argentinus*.
 Leaflets grayish canescent, greener above, flat. 20. *L. lupinus*.

V. SULPHUREI

- Flowers 12-14 mm long; upper lip of calyx about 8 mm long. 21. *L. flavescens*
 Flowers 1 cm long or less, upper lip of calyx very short, only 4 mm long.
 Inflorescence loosely pubescent, flowers about 10 mm long. 22. *L. sulphureus*.
 Inflorescence finely appressed-silky, flowers about 8 mm long. 23. *L. lucidulus*

VI. ALBICAULES

- One species 24. *L. albicaules*

VII. FOLIOSI.

- Flowers about 15 mm long, pubescence long, sparse. 11. *L. alpestris*
 Flowers 8-12 mm long, pubescence short
 Banner glabrous
 Bracts linear-subulate, long-attenuate, 8-12 mm long, longer than the buds
 Flowers dark blue, ascending, in lax racemes, calyx appressed-silky. 25. *L. adscendens*.
 Flowers white in dense racemes, spreading; calyx with spreading hairs. 26. *L. ingratus*
 Bracts lanceolate, short-acuminate, 4-7 mm long; flowers spreading, calyx with short spreading hairs
 Flowers dark blue or dark purple, stems simple, low, 1-3 dm high, from a caespitose caudex
 Pubescence of the stem and leaves short 27. *L. Macounii*.
 Pubescence of the stem and leaves rather long 70. *L. monticola*.
 Flowers lilac or rose-colored, rarely white, plant tall, 3-8 dm high, branched. 28. *L. foliosus*.
 Banner more or less pubescent
 Corolla light blue or lilac, 7-8 mm long; keel glabrous 29. *L. laxus*
 Corolla 8-10 mm long, keel ciliate on the margins
 Corolla dark blue or purple, stems mostly simple 30. *L. pulcherrimus*
 Corolla light blue, or lilac, or pink, stem much branched 8. *L. argenteus*

VIII. ORNATI

- Bracts subulate, much longer than the flower-buds 31. *L. flexuosus*
 Bracts ovate or lanceolate, rarely exceeding the flower-buds.
 Flowers less than 12 mm long
 Flowers 6-7 mm long 32. *L. tenuispicus*.
 Flowers 8-10 mm long. 33. *L. Greenei*.
 Flowers over 12 mm long
 Stem few-leaved, only slightly exceeding the long petioles of the basal leaves
 Pubescence of the leaves long and rather loose, hirsute rather than silky. 34. *L. Rydbergii*
 Pubescence of the leaves fine and short, strictly appressed and silky.
 Pubescence of the calyx and pedicels short, loose and spreading. 35. *L. humicola*.
 Pubescence of the calyx and pedicel densely and finely appressed-pubescent, silky 36. *L. Hellerae*.
 Stems very leafy, many times exceeding the basal leaves
 Flowers 15-20 mm long, pubescence at least on the inflorescence brownish in age 37. *L. ornatus*
 Flowers 10-14 mm long, pubescence white-silky. 38. *L. leucopsis*.

IX. CYTISOIDES.

- Stem arachnoid-villous, flowers 18-20 mm long 39. *L. nootkatensis*.
 Stem sparingly hairy or glabrous, flowers 10-15 mm long
 Stem decidedly pubescent with long spreading hairs
 Banner only slightly shorter than the wings, plant 2-7 dm high 40. *L. Wyethii*.
 Banner much shorter than the wings, plant about 10 dm high.
 Racemes dense, flowers about 12 mm long, dark blue, verticillate, leaflets oblanceolate, long-hairy beneath 41. *L. amplius*.
 Racemes lax, flowers about 10 mm long, light blue or white, mostly singly; leaflets narrowly oblanceolate, short-hairy beneath 42. *L. marianus*
 Stem glabrous or nearly so
 Calyx and bracts villous 43. *L. Burkei*.
 Calyx and bracts appressed-silky. 44. *L. cytisoides*.

X. POLYPHYLLI.

- Stem decidedly hairy; leaflets oblanceolate 45. *L. glabratus*.
 Stem glabrous or nearly so, leaflets narrowly oblanceolate. 46. *L. polyphyllus*.

XI. AMMOPHILI.

- Keel ciliate on the margins, leaves rather thick. 47. *L. ammophilus*.
 Keel glabrous; leaves thin. 48. *L. glabratus*.

XII. CYANEI.

- Pubescence of the stem long, leaves greener. 48. *L. comatus*.
 Pubescence rather short, leaves canescent or silvery.

Pubescence of the leaves appressed.

Corolla blue; banner with a light spot.

Bracts linear-lanceolate to subulate, 5-8 mm. long.

Corolla 12-14 mm. long, leaflets 3-7 cm. long. 49. *L. sericeus*.

Corolla 10 mm. long or less; leaflets 2-3 cm. long 50. *L. apronosus*.

Bracts lanceolate, 3-5 mm. long.

Leaflets densely pubescent above; corolla about 12 mm. long.

51. *L. Bakeri*.

Leaves sparingly pubescent or glabrate above; corolla about 10 mm. long.

52. *L. cyaneus*.

Corolla at first white; banner turning purplish; no light spot.

53. *L. dichrous*.

Pubescence of the leaves long and loose; corolla light purple or pink; banner with a dark spot.

54. *L. flavaulis*.

XIII. LEUCOPHYLLI.

Racemes elongate, 1-3 dm. long, terminal.

Flowers numerous in a very long and dense raceme

Bracts lanceolate, not much longer than the buds

Pubescence not very dense

Pubescence on the leaves appressed.

55. *L. macrostachys*.

Pubescence on the leaves short, spreading.

56. *L. retrorsus*.

Pubescence very dense, in age more or less rusty, and rather loose

57. *L. leucophyllus*

Bracts subulate, much exceeding the buds; flowers about 16 mm. long.

Pubescence of the leaves long and loose.

58. *L. plumosus*.

Pubescence of the leaves short, appressed.

59. *L. Jonesii*.

Flowers in a long, but lax raceme.

60. *L. barbiger*

Racemes short, 3-5 cm. long, terminating short divaricate branches.

61. *L. ramosus*

XIV. LEPIDI.

Stem trailing or decumbent.

62. *L. depressus*

Stem erect or ascending, if at all decumbent, only so at the base.

Pubescence of the stem and leaves loose.

63. *L. aridus*

Pubescence of the stem and leaves appressed

Flowers 7-10 mm. long, stem mostly 1-leaved or leafless; pubescence short.

Racemes short, dense, 2-5 cm. long; flowers about 10 long.

64. *L. minimus*.

Racemes elongate, 8-9 cm. long, flowers 7-8 mm. long.

65. *L. erectus*.

Flowers 12 mm. long or more; stem with several stem-leaves, pubescence long.

66. *L. lepidus*.

XV. CANDICANTES.

Flowers 9-10 mm. long or more.

Peduncles short, raceme elongate

67. *L. psoralitoides*

Peduncles elongate, racemes short.

68. *L. candicans*

Flowers 6-7 mm. long.

69. *L. Evermannii*.

XVI. MONTICOLAE.

Flowers 9-10 mm. long; petals dark blue, banner with a light spot.

70. *L. monticola*

Flowers 7-8 mm. long; petals light rose, turning yellowish.

71. *L. roseolus*

XVII. CAESPITOSI.

Plant loosely pubescent with long hairs.

Racemes very short and dense, sessile; bracts lanceolate, about equalling the flowers; pubescence rather appressed.

72. *L. caespitosus*.

Racemes elongate; bracts subulate, exceeding the flowers; pubescence spreading.

73. *L. Watsonii*

Plant densely canescent.

74. *L. Cusickii*.

XVIII. CONCINNI.

One species.

75. *L. micensis*

XIX. PUBILLI.

Racemes dense, subcapitate; lower lip of the calyx 2-3-toothed.

Plant almost stemless; lower lip of the calyx oval or ovate.

76. *L. brevicaulis*.

Plant with distinct leafy stem; lower lip of the calyx oblong-lanceolate.

77. *L. Kingii*

Racemes more elongate and less dense, lower lip of the calyx entire.

Peduncles much exceeding the leaves.

78. *L. scaposus*

Peduncles very short, shorter than the petioles.

Racemes lax, usually much exceeding the leaves; lower part of the calyx and pedicels glabrous.

79. *L. rubens*.

Racemes dense, slightly if at all exceeding the leaves; calyx and pedicels densely hirsute.

80. *L. pusillus*.

1. *L. plattensis* S. Wats. Stem short, densely leafy, 2-5 dm. high; leaflets 7-9, oblanceolate, obtuse or acutish, thick, somewhat glaucous, grayish silky-strigose beneath, 2-4 cm. long; racemes 1-1.5 dm. long; bracts lanceolate,

seeded. *L. alsophilus* Greene. Hillsides, border of woods, and mountain valleys: Mont.—Colo.—Utah. *Submont.*—*Subalp.* Je—Au.

12. *L. maculatus* Rydb. Stem 4–6 dm. high; leaflets 5–7, those of the lower leaves obovate-oblanccolate, mucronate, those of the upper oblanceolate and acute, sparingly appressed-hairy beneath, 3–5 cm. long; bracts ovate-lanceolate, acuminate, deciduous, lips of the calyx ovate-lanceolate, the lower 7 mm. long, the upper 6 mm. long; flowers 10–12 mm. long; banner light purple, with a dark spot, glabrous, much shorter than the white or purple-tinged wings; keel white, with purple tip; pods oblong, 2.5–3.5 cm. long, 4–6-seeded. Hillsides: e Utah—w Colo. *Submont.*—*Mont.* Jl—Au.

13. *L. floribundus* Greene. Stems branched, leafy; leaflets 7–9, narrowly oblanceolate, acute, 3–6 cm. long, strigose beneath; bracts lanceolate, shorter than the calyx; upper lip of the calyx 3 mm. long, lance-ovate; lower lip lanceolate, 4 mm. long; corolla darker or lighter, blue or violet, about 6 mm. long; petals subequal; pod 1.5–2 cm. long, 3–4-seeded. *L. myranthus* Greene. (?) *L. fulvo-maculatus* Payson. Mountain meadows: Colo.—Wyo.—Utah. *Mont.* Jl—Au.

14. *L. leptostachyus* Greene. Stems leafy, 3–6 dm. high; leaflets 7–9, narrowly linear-oblanccolate, 3–5 cm. long, strigose, but green beneath; bracts lanceolate, about equalling the calyx; upper lip of the latter 3 mm., the lower 4 mm. long, both ovate, obtuse, merely retuse at the end; corolla pale blue, 6 mm. long, the banner somewhat darker than the other petals, with a brownish eye. Ledges: Colo. *Submont.* Je—Jl.

15. *L. parviflorus* Nutt. Stems slender, 5–10 dm. high, branching; leaflets 5–11, broadly oblanceolate to obovate, obtuse, 3–5 cm. long, slightly strigose beneath, green; racemes 1–3 dm. long; bracts linear-subulate, equalling the calyx, deciduous; lips of the calyx nearly equal, 6 mm. long, broadly lanceolate, corolla light blue, sometimes white, about 6 mm. long; banner glabrous; legume 2–2.5 cm. long, 3–4-seeded. Meadows and among bushes: S.D.—Colo.—Utah—Mont. *Submont.*—*Alp.* Je—S.

16. *L. calcaratus* Kell. Stems 4–7 dm. high; leaflets 7–11, linear-oblanccolate, 3–5 cm. long, pubescent above, silvery-silky beneath; racemes slender, 6–12 cm. long; bracts subulate, caducous; calyx appressed-silky; lower lip longer than the upper; corolla from nearly white to purple, sometimes bi- or tri-colored; banner slightly pubescent on the back; pod 2–5-seeded. *L. multinctus* A. Nels. Hills and plains: Calif.—Utah—Ida.—Ore. My—Je.

17. *L. laxiflorus* Dougl. Stems erect, 3–6 dm. high, slender; leaflets 6–10, narrowly linear-oblanccolate, 3–5 cm. long, acute, short-strigose on both sides, green; racemes lax, 1–2 dm. long; bracts subulate, shorter than the calyx; calyx appressed-silky; upper lip lance-ovate, 5 mm. long, the lower lanceolate, 6 mm. long; corolla blue, 8–10 mm. long, petals sub-equal, legume about 2 cm. long, 4–6-seeded. Meadows: Wash.—Calif.—Ariz.—Mont. *Submont.*—*Mont.* My—Jl.

18. *L. aduncus* Greene. Stems 3–10 dm. high, silky-canescens; leaflets 7–9, narrowly oblanceolate, 2–3 cm. long, acute, appressed-silky on both sides, often conduplicate; raceme 1–2.5 dm. long; bracts ovate-lanceolate, shorter than the calyx; calyx densely appressed-silky; lower lip lanceolate, 7 mm. long, the upper ovate-lanceolate, nearly as long; corolla dark blue, about 10 mm. long; petals subequal; pod 2–3 cm. long, 5–6-seeded. *L. decumbens argophyllus* A. Gray. *L. Helleri* Greene. *L. argophyllus* Cockerell. Plains, cañons, and river banks: Neb.—N.M.—Utah—Wyo. *Submont.*—*Mont.* My—Jl.

19. *L. argentinus* Rydb. Stem 4–6 dm. high; leaflets about 7, oblanceolate, densely silky on both sides, 3–5 cm. long; inflorescence rather short and dense; bracts ovate-lanceolate, short, deciduous; flowers 10–12 mm. long; calyx and pedicels densely white-silky; lower lip lanceolate, 7–8 mm. long, the upper ovate, 5–6 mm. long; corolla bluish purple; banner pubescent on the back; pods about 3 cm. long and 5–6-seeded. *L. holosericeus utahensis* S. Wats. Hills: Utah—Neb. *Son.*—*Submont.* Je—Au.

20. *L. lupinus* Rydb. Stem 3–6 dm. high, densely canescent; leaflets 5–9, oblanceolate, usually flat, 3–6 cm. long, appressed-canescens on both sides,

racemes 5-10 cm. long; bracts lanceolate, 3-4 mm. long, deciduous; calyx silvery; upper lip scarcely 3 mm. long, the lower 5 mm. long; corolla about 1 cm. long, dark blue or purple; banner with a light spot; pod 3 cm. long, 3-seeded. Along streams and in meadows: Utah. *Submont.*—*Mont.* Jl—Au.

21. *L. flavescens* Rydb. Stem about 3 dm. high; leaflets about 7, oblanceolate, 3-4 cm. long, appressed-silky on both sides; inflorescence short; bracts lanceolate, early deciduous; calyx densely pubescent with short spreading hairs, gibbous at the base, its lips almost equal in length, about 8 mm. long; corolla pale yellow; banner with a darker spot, glabrous. Prairies. Ida.—*Mont.* Je.

22. *L. sulphureus* Dougl. Stems 4-8 dm. high; leaflets 7-10, oblanceolate, yellowish green, softly strigose on both sides, 3-5 cm. long; raceme 1-2 dm. long, rather lax; bracts lanceolate, shorter than the calyx; calyx more or less spurred at the base, short-pubescent with spreading hairs, lower lip lanceolate, about 6 mm. long, the upper ovate, 5 mm. long; seeds 4-5. Plains. Ida.—Wyo.—Utah—Ore. *Son.*—*Submont.* Je—Au.

23. *L. lucidulus* Rydb. Stem 5-6 dm. high, branched above, especially the upper portions, leafy; leaflets 7-8, linear-oblanceolate, silky and silvery on both sides, about 3 cm. long; raceme 1-2 dm. long, lax; flowers scattered; pedicels and calyx densely pubescent with short strictly appressed silky hairs; lower lip of the calyx about 5 mm. long, lanceolate, almost twice as long as the short ovate upper one; corolla yellow or light pink; banner slightly exceeding the wings, with a darker spot. Hills: Wyo. *Submont.* Au.

24. *L. albicaulis* Dougl. Stem 3-10 dm. high, straw-colored; leaflets oblanceolate, 3-5 cm. long, short-pubescent on both sides; bracts subulate; calyx with short spreading hairs; lips subequal; petals 10-14 mm. long, blue, violet or whitish; banner glabrous; pods 3-6-seeded. Plains. Wash.—Ida.—Calif. Je—Jl.

25. *L. adscendens* Rydb. Stem 4-6 dm. high, appressed-silky, leafy; leaflets about 7, linear-oblanceolate, 4-5 cm. long, acute, appressed-silky on both sides, but green; racemes elongate, narrow; flowers about 12 mm. long; calyx grayish silky; lower lip 8 mm. long, slightly longer than the upper, both lanceolate; bract linear-subulate, much longer than the buds, equalling the calyx in length; corolla dark bluish purple; banner glabrous, with a lighter spot. Mountains: Wyo.—Utah. *Submont.* Jl.

26. *L. ingratus* Greene. Stems several, 3-6 dm. high, sparingly strigose; leaflets 7-9, narrowly oblanceolate, sparingly appressed-pubescent on both sides, 2-4 cm. long, inflorescence many-flowered; upper calyx-lip ovate, 3 mm. long, the lower lanceolate, 4 mm. long; corolla white, 8 mm. long, the banner with a brownish spot; pod 1.5-2 cm. long, 4- or 5-seeded. Hills: N.M.—(? Colo.). *Submont.* Jl—S.

27. *L. Macounii* Rydb. Stems several, 3-6 dm. high, somewhat branched; leaflets about nine, linear-oblanceolate, 2-3 cm. long, usually conduplicate, silky-strigose on both sides; racemes dense, 5-10 cm. long; calyx gibbous at the base; lower lip lanceolate, 6-7 mm. long, the upper hardly 4 mm. long, ovate; corolla 8-9 mm. long, dark blue, the banner with a lighter spot, somewhat shorter than the wings; legume about 2 cm. long, 3-4-seeded. Plains and mountains: Sask.—Wyo.—*Mont.* *Plain.*

28. *L. foliosus* Nutt. Stems erect, 3-8 dm. high, branched, usually with erect branches; leaflets narrowly oblanceolate, usually conduplicate, silky-strigose on both sides, 2-5 cm. long; calyx densely silky-canescens; lower lip lanceolate, 6-7 mm. long, upper lance-ovate, 5-6 mm.; corolla about 1 cm. long; petals subequal; legume about 2 cm. long, 3-4-seeded. Hills and plains: Wash.—Ida.—Colo.—*Mont.* Je—Au.

29. *L. laxus* Rydb. Stem 4-6 dm. high, slender; leaflets 7-9, linear or linear-oblanceolate, 3-4 cm. long, green, but appressed-silky on both sides; racemes slender and lax; bracts lanceolate, short-acuminate, not longer than the buds; pedicels and calyx rather long-hairy; calyx not spurred; lower lip lanceolate, 5 mm. long, the upper slightly shorter; corolla light bluish purple; banner broad, somewhat shorter than the wings. Meadows: *Mont.*—Wyo. *Submont.* Jl.

30. *L. pulcherrimus* Rydb. Stems 3-6 dm. high, leafy; leaflets 7-9, linear-oblongate, acute, appressed-silky on both sides, but green; raceme more or less elongate and rather dense; bracts lanceolate, short-acuminate, shorter than the buds, deciduous; calyx grayish silky; lips lanceolate, the lower 6 mm. long, the upper somewhat shorter; corolla dark purple; banner with a light spot, pubescent on the back; pods 3-3.5 cm. long, 5-6-seeded. Meadows: B.C.—Colo.—Utah—Mont. *Mont.*—*Subalp.* My—Au.

31. *L. flexuosus* Lindl. Stem 4-5 dm. high, striate, leafy; leaflets 7-10, narrowly oblanceolate or linear-oblongate, densely appressed-silky on both sides, 2-4 cm. long; raceme dense, 1-1.5 dm. long; calyx appressed silky-canescens, scarcely gibbous; lower lip 8 mm. long, narrowly lanceolate, the upper ovate-lanceolate, 6 mm. long; corolla dark blue, with keel and a spot on the banner, light-colored, about 1 cm. long; banner rather densely pubescent without. *L. subulatus* Rydb. Plains: Mont.—Wash.—(? Utah). *Plain*—*Submont.*

32. *L. tenuispicus* A. Nels. Stem 3-7 dm. high, silvery-silky; leaflets 6-9, narrowly oblanceolate, 4-6 cm. long, silvery-silky, with long hairs; spike slender, crowded, 5-15 cm. long; bracts linear-lanceolate, shorter than the calyx; lips subequal; corolla blue or purple, 6-7 mm. long; banner pubescent on the back; pods 1-3-seeded. Mountains: Ore.—Wash.—Ida. Au.

33. *L. Greeni* A. Nels. Stems several, usually erect; leaflets 7-10, narrowly oblanceolate, densely appressed silky-canescens, 2-5 cm. long, obtuse, mucronate; calyx densely canescent; lower lip lanceolate, 6-7 mm. long, the upper slightly shorter; corolla 7-9 mm. long; petals subequal, dark bluish purple; banner hairy outside, with a light brownish spot; pod about 1.5 cm. long, 3-seeded. *L. oreophilus* Greene. River banks and benchland: Ore.—Nev.—Utah—Colo.—Wyo. *Submont.* My—Jl.

34. *L. Rydbergii* Blankinship. Stems several, about 3 dm. high; leaflets 8-10, oblanceolate, 2-4 cm. long, coarsely canescent; racemes 8-14 cm. long; bracts linear, scarcely exceeding the buds; calyx canescent, gibbous; lower lip 7 mm., upper lip about 5 mm. long; corolla dark blue, about 10 mm. long; banner with a light spot, glabrous; legumes 3-5-seeded. Hills: Mont.—Ida. *Plain*—*Submont.* My—Je.

35. *L. humicola* A. Nels. Stems several, erect or ascending, 3-6 dm. high, few-leaved; leaflets 7-12, narrowly oblanceolate, appressed-silky on both sides, 4-7 cm. long; raceme dense, 1-2 dm. long; bracts lanceolate, shorter than the buds; corolla blue, about 1 cm. long; banner glabrous, with a light spot; pod 2.5-4 cm. long, normally 6-seeded. Hills and mountain slopes: Colo.—Mont. *Submont.*—*Mont.* Je—Au.

36. *L. Hellenae* Heller. Stems several, clustered, erect, 3-4 dm. high, few-leaved; leaflets 7-9, narrowly oblanceolate, 4-5 cm. long, acute; bracts narrowly lanceolate, shorter than the buds; calyx-lobes lanceolate, the lower 8 mm., the upper 7 mm. long; corolla dark blue, 12-15 mm. long; banner with a lighter spot, nearly glabrous; legume 2.5-3 cm. long, 4-6-seeded. Sandy and gravelly soil. Ida. *Submont.* My.

37. *L. ornatus* Dougl. Stem erect or decumbent at the base, leafy, 5-10 dm. high; leaflets 5-9, oblanceolate, 4-8 cm. long, acute, appressed silky-canescens; racemes 7-20 cm. long; bracts lanceolate, usually shorter than the buds; calyx silky-canescens; lower lip lanceolate, 10-12 mm. long, the upper ovate-lanceolate, 9-10 mm.; corolla dark blue; banner with a light spot, somewhat pubescent on the back; legume 2.5-3.5 cm. long, 5-7-seeded. Hillsides and plains: Ida.—(? Mont.)—Wash. *Plain*—*Submont.* Ap—Je.

38. *L. leucopsis* Agardh. Stems 4-8 dm. high; leaflets 6-12, densely appressed silky-canescens, oblanceolate, 3-6 cm. long; raceme dense, 1-2 dm. long; bracts lanceolate, slightly exceeding the flower-buds; calyx densely canescent; lower lip lanceolate, 7-8 mm. long, the upper ovate-lanceolate, about 6 mm. long; corolla blue; banner with a light spot, densely hairy outside; pod 2.5-3 cm. long, about 5-seeded. *L. sericeus* Wats., in part. *L. axillaris* Blankinship. Plains: Wash.—Ore.—Nev.—Wyo.—Sask. *Plain*—*Mont.* My—Au.

39. *L. nootkatensis* Donn. Stem 3-6 dm. high, stout, more or less decumbent at the base, arachnoid-long-villous, especially upwards; leaflets 6-8, oblanceolate, obtuse and mucronate or acutish, 3-5 cm. long, glabrous above, long-villous beneath; raceme dense, nearly sessile; bracts linear-lanceolate, equalling the calyx; calyx densely villous; lower lip 10 mm., upper lip 8 mm. long; corolla dark blue, glabrous; wings and banner subequal; legume about 4 cm. long, 9-12-ovuled. Wet places: Vancouver Island—Alta.—Alaska. *Subalp.* Je-Jl.

40. *L. Wyethii* S. Wats. Stem 2-7 dm. high, few-leaved, sparingly long-villous, with spreading hairs; leaflets 8-12, narrowly oblanceolate, 3-6 cm. long, acute, glabrous above, sparingly long-hairy beneath; calyx villous; upper lip ovate, 5 mm. long, 2-toothed; lower lip lanceolate, 6-7 mm. long, entire; corolla dark blue; wings 12 mm. long; banner glabrous, slightly shorter; keel slightly ciliate; legume 3-4 cm. long, 7-8-ovuled. Grassy hillsides: B.C.—Wash.—Ida.—Mont. *Submont.* My-Je.

41. *L. amplius* Greene. Stem clustered, 4-10 dm. high, sparingly hairy with long spreading hairs; leaflets 9-10, oblanceolate, 5-12 cm. long, glabrous above, long-hairy beneath; racemes 1-2.5 dm. long; calyx villous; upper lip 3-5 mm. long, ovate, the lower lanceolate, 5-6 mm. long, entire; corolla dark blue, veined; banner glabrous; keel ciliate. Mountains: Colo. *Mont.* Je.

42. *L. marianus* Rydb. Stem 5-10 dm. high, hirsute-villous, with rather short hairs, slender; leaflets 6-8, narrowly oblanceolate, 3-7 cm. long, acute, glabrous above, appressed short-hairy beneath; inflorescence lax, 1-1.5 dm. long; calyx villous; lips lanceolate, the upper 7 mm., the lower 8 mm. long; banner slightly pubescent on the back, 8-10 mm. long, light-blue or white, with a darker spot; wings light blue or white, 10-12 mm. long; legume 3-4 cm. long. River banks: Utah. *Submont.* Jl.

43. *L. Burkei* S. Wats. Stem 3-8 dm. high, few-leaved, sparingly hairy, with long spreading hairs or nearly glabrous; leaflets about 8, oblanceolate, 4-8 cm. long, glabrous above, sparingly pubescent or glabrate beneath; raceme dense, 1-3 dm. long; calyx villous; upper lip 5 mm., the lower 7 mm. long; corolla light blue, with dark veins; banner glabrous, about 10 mm. long; wings 12 mm. long; legume 3-4 cm. long, 6-8-seeded. Meadows: B.C.—Wash.—Nev.—Wyo.—Mont. *Submont.*—Mont. Je-Jl.

44. *L. cytisoides* Agardb. Stem stout, erect, 6-15 dm. high, leafy, branching, glabrous or nearly so; leaflets 7-10, oblanceolate, 4-12 cm. long, glabrous above, appressed short-hairy beneath, thin; raceme 2-6 dm. long; calyx appressed-silky; upper lip 6 mm. long, ovate; lower lip lanceolate, 8 mm. long; corolla blue; wings about 12 mm.; banner glabrous, about 10 mm. long; legume 4-5 cm. long, 8-11-seeded. *L. rivularis* S. Wats., not Dougl. Banks: B.C.—s Calif.—Ida. *Son.*—*Submont.* My-Jc.

45. *L. glabratus* (S. Wats.) Rydb. Stem 3-4 dm. high, leafy, slender, villous, with spreading hairs; leaflets 7-8, thin, light green, glabrous above, long-ciliate beneath, narrowly oblanceolate, 2-3.5 cm. long, acute; inflorescence rather dense, 1-1.5 dm. long; calyx villous; upper lip ovate, 4 mm. long, the lower lanceolate, 5 mm. long; corolla light blue or whitish, tinged with blue; wings 10 mm. long; banner glabrous, slightly shorter; keel glabrous or slightly ciliate. *L. ornatus glabratus* S. Wats. Hills: Colo.—Wyo. *Submont.* Je.

46. *L. polyphyllus* Lindl. Stem stout, erect, 6-15 dm. high, leafy; leaflets 8-16, narrowly oblanceolate, glabrous above, appressed-pubescent or glabrous beneath, 5-12 cm. long, acute; raceme often 3-6 dm. long; calyx villous, gibbous; lower lip 7-8 mm. long, lanceolate, the upper ovate, 6-7 mm.; corolla blue or purple, seldom white; wings 12-15 mm. long; banner glabrous, slightly shorter; keel glabrous; pod 4-5 cm. long, about 9-seeded. Meadows: B.C.—Mont.—c Calif. *Submont.*—Mont. My-Je.

47. *L. ammophilus* Greene. Stem low, 2-6 dm. high, mostly leafy at the base, hirsute with long spreading hairs; leaflets 7-11, obovate or oblanceolate, obtuse or acute, light green and glabrous above, sparsely hirsute beneath, thick,

2-4 cm. long; racemes 1-2 dm. long; bracts lanceolate, about equalling the calyx; calyx hirsute; upper lip ovate, 5 mm. long, the lower lanceolate, 8 mm. long; corolla blue or purple; banner glabrous, 10-11 mm. long, with a yellowish or reddish spot; wings 11-12 mm. long; keel ciliate on the margin; pod 3-4 cm. long, 4-6-seeded. Sandy bottoms and dry banks: Colo.—Utah—N.M. *Submont.*—Mont. Ap-Je.

48. *L. comatus* Rydb. Stem 3-7 dm. high, pubescent with long spreading silky hairs; leaflets narrowly oblanceolate, acute, 2.5-4 cm. long, green, pubescent on both sides, raceme short and dense, 5-15 cm. long; bracts lanceolate-subulate, equalling or exceeding the buds, calyx densely pubescent with spreading hairs; lips almost equal, ovate-lanceolate, 6 mm. long; flowers 8-10 mm. long; corolla bluish purple, rarely white; banner slightly shorter than the broad wings; pod about 4 cm. long, 4-8-seeded. (?) *L. habrocomus* Greene. Mountains: Colo.—Utah. Mont. Je-Jl.

49. *L. sericeus* Pursh. Stem erect, 3-6 dm. high, densely silky-hirsute, leafy; leaflets 5-10, narrowly oblanceolate, densely silky, acute, 3-7 cm. long; raceme 1-2 dm. long, rather dense; calyx silky-hirsute; lower lip narrowly lanceolate, 7-9 mm. long; upper lip ovate, 6-7 mm. long; corolla dark blue, banner with a light spot, pubescent on the back; legume about 3 cm. long, 4-6-seeded. Plains and hills: Ore.—Ida.—Wyo.—S.D.—Mont. *Submont.* My-Au.

50. *L. aphronosus* Blankinship. Stems 2-4 dm. high, densely pubescent, with short spreading hairs; leaflets 6-8, oblanceolate, densely silky on both sides, 2-3 cm. long, acute; raceme 5-10 cm. long, dense; calyx silky, with short spreading hairs; lower lip linear-lanceolate, 6 mm. long; upper lip ovate, 5 mm. long; corolla blue; banner with light spot, pubescent outside. Fields and plains: Mont. Jl-Au.

51. *L. Bakeri* Greene. Stems several, leafy, 6-10 dm. high, densely hirsutulous, with short spreading hairs; leaflets 7-9, oblanceolate, densely silky on both sides, acute, 3-6 cm. long; raceme 1-2 dm. long; calyx densely silky-hirsute with short hairs; lower lip linear-lanceolate, about 8 mm. long; upper lip ovate, 6 mm. long; corolla dark blue to reddish purple; banner with a light spot, sparingly pubescent without; legume 2.5-3 cm. long, 5-6-seeded. *L. arcentinus* Greene. Mountains: Colo. *Submont.* My-Je.

52. *L. cyaneus* Rydb. Stem 4-9 dm. high, densely short-villous, very leafy; leaflets 7-11, oblanceolate, 3-9 cm. long, glabrous or nearly so above, almost velvety beneath, acute; raceme dense, 1.5-2 dm. long; calyx white-velvety; lower lip about 8 mm. long; banner slightly hairy on the back, light blue, with a light brownish spot at the center, about 8 mm. long; wings light blue, about 1 cm. long; pod about 25 mm. long, 4-5-seeded. Mountains: Mont. Jl.

53. *L. dichrous* Greene. Stem erect, about 1 m. high, densely pubescent with short spreading hairs, leafy; leaflets 7-8, narrowly oblanceolate, 4-5 cm. long, densely silky-canescens, acute; raceme lax, 1.5-3 dm. long; bracts lanceolate, shorter than the buds; calyx densely pubescent, with short spreading hairs, lower lip linear-lanceolate, 7 mm. long; upper lip ovate-lanceolate, 5 mm. long, corolla 10-12 mm. long; banner shorter than the wings, pubescent without; legume about 3 cm. long, about 5-seeded. Mountains: Colo. *Submont.* Jc.

54. *L. flavicaulis* Rydb. Stems several, densely pubescent, with short yellowish spreading hairs, almost velutinous, 3-5 cm. high; leaflets 7-10, narrowly oblanceolate, usually conduplicate, densely silky on both sides, acute, 2-4 cm. long; racemes dense, 5-10 cm. long; bracts subulate, shorter than the buds, calyx villous; lower lip lanceolate, 7 mm. long; upper lip ovate, 5-6 mm. long, corolla about 10 mm. long; legume 2-2.5 cm. long, 3-4-seeded. River bottoms: Wyo.—Utah. *Submont.*

55. *L. macrostachys* Rydb. Stem 5-10 dm. high, puberulent and with long silky spreading or reflexed hairs; leaflets 7-8, linear-oblanceolate, acuminate, 3-6 cm. long, appressed-silky on both sides; raceme dense, 2-3 dm. long; calyx velutinous; lower lip broadly lanceolate, obtuse, about 8 mm. long; upper lip ovate, almost as long; corolla 10-12 mm. long, dirty white, tinged with blue;

banner with a darker spot; legumes fully 2 cm. long, 4-5-seeded. Along river banks: Mont. *Submont.*

56. *L. retrorsus* Henders. Stem 6-9 dm. high, hirsute, with reflexed hairs; leaflets greenish-villous above, white-villous beneath, 4-7 cm. long, narrowly oblanceolate; racemes 6-30 cm. long; flowers 8-12 mm. long; upper calyx lip shorter than the lower; banner pubescent; keel ciliate; pod 2 cm. long, 3-6-seeded. Grassy places: Ida. Au.

57. *L. leucophyllus* Dougl. Stem 6-10 dm. high, leafy, branched, velutinous and with scattered longer, spreading or reflexed hairs; leaflets 7-10, oblanceolate, 3-7 cm. long, densely silky-canescens on both sides, in age fulvous; racemes dense, 1.5-3 dm. long, sessile or nearly so; calyx velutinous; lower lip lanceolate, 8-9 mm. long, the upper lance-ovate, 7-8 mm. long; corolla 10-12 mm. long, light blue, pink, or white, with darker striations; banner with a lighter spot, densely hairy without; legume about 2.5 cm. long, 5-6-seeded. Meadows and hills: Wash.—Calif.—Utah—Wyo.—Mont. *Submont.*—Mont. My-Jl.

58. *L. plumosus* Dougl. Stem stout, erect, 5-8 dm. high, densely pubescent partly with short, partly with long shaggy, reflexed or spreading hairs; leaflets 5-9, oblanceolate, densely long-silky on both sides, acute, 3-5 cm. long; racemes dense, 1-2 dm. long; calyx gibbous, shaggy-silky; lower lip lanceolate, 7 mm. long, the upper ovate, 6 mm. long; corolla light blue or pink; banner with a yellowish spot, densely hairy without, legume 2-2.5 cm. long, 4-5-seeded. Meadows: Wash.—Ore.—Utah—Ida. *Submont.* Je-Jl.

59. *L. Jonesii* Rydb. Stem over 1 m. high, densely pubescent with a short pubescence and long spreading silky hairs, leaflets 7-9, oblanceolate, densely appressed-pubescent, with short yellowish hairs on both sides, 4-7 cm. long; raceme long and dense, many-flowered; flowers about 16 mm. long; calyx yellowish, silky; lips ovate-lanceolate, the lower about 8-9 mm. long, the upper 6-7 mm. long; corolla white or ochroleucous, rarely pinkish; banner with a faint brownish spot; legume about 3 cm. long, 6-7-seeded. Sandy plains and mountains: Utah. Je-Au.

60. *L. barbiger* S. Wats. Stem 5-7 dm. high, densely pubescent, with short stiff hairs and some longer ones; leaflets 5-7, narrowly oblanceolate, silky on both sides, 4-7 cm. long; bracts setaceous, longer than the calyx, lower calyx-lip narrow, lanceolate, entire, slightly longer than the ovate upper one; corolla 1 cm. long, mostly ochroleucous; petals subequal; keel copiously ciliate; pod about 7-seeded. Meadows. s Utah.

61. *L. ramosus* E. Nels. Stems several, 2-4 dm. high, with divaricate branches, finely canescent and sparingly villous; leaflets 5-8, narrowly oblanceolate, densely soft-silky on both sides, 2-4 cm. long; bracts ovate or lanceolate, 2 mm. long; flowers about 1 cm. long; calyx silky, the lower lip a little longer than the upper, banner silky on the back, pale blue, with a yellowish white spot, pod 3-5-seeded. Dry banks: Wyo. Au.

62. *L. depressus* Rydb. Plant caespitose; stems decumbent, 1-2 dm. long, appressed silvery silky pubescent; leaflets about 7, oblanceolate, usually obtusish, 1.5-2 cm. long, densely appressed silvery canescent; racemes short; bracts lanceolate; flowers 8-9 mm. long; calyx long-villous; lips ovate-lanceolate, the lower about one-third longer than the upper; corolla light bluish purple; banner glabrous, slightly shorter than the wings. Gravelly mountain slopes: Ida. Jl.

63. *L. aridus* Dougl. Densely caespitose; stems 1-2 dm. high, loosely hirsute, leafy at the base; inflorescence loose, 5-10 cm. long; bracts subulate, about equalling the buds; calyx long-silky; lips lanceolate, subequal, about 6 mm. long; corolla purple or violet, about 1 cm. long; pod 1 cm. long, 3-4-seeded. Dry prairies. Wash.—Ore.—Canadian Rockies. *Subalp.* My-Jl.

64. *L. minimus* Dougl. Densely caespitose, subcaulescent perennial, 1-1.5 dm. high; leaflets 5-9, oblanceolate or obovate, acute, densely silky canescent, 0.5-1.5 cm. long; raceme short, dense, 2-5 cm. long; bracts lanceolate, acuminate, shorter than the buds; calyx canescent; lips lanceolate, the lower 6 mm., the

upper 5 mm. long; corolla blue or purple, 9–10 mm. long. *L. ovinus* Greene. Plains and hills: Wash.—Ore.—Ida.—Alta. Jl—Au.

65. *L. erectus* Henders. Cespitose perennial; stems 2.5–3.5 dm. high; basal leaves many; leaflets 5–8, linear-oblong to narrowly oblanceolate, acute, 1.5–4 cm. long, appressed silky-canescens; cauline leaves 1–2, bracts persistent, lanceolate to subulate, equalling the calyx; calyx silky; lips subequal; banner obovate, silky, reflexed. Dry ground: Ida. *Submont.*—*Mont.* Jl.

66. *L. lepidus* Dougl. Densely cespitose perennial; stems 1–4 dm. high, leafy mostly at the decumbent base; leaflets 7–9, oblanceolate, 1–3 cm. long, silky but green, acute; racemes rather lax, 5–20 cm. long; bracts lance-subulate, about equalling the buds; calyx silky-canescens; lips lanceolate, the lower 6 mm. long, the upper slightly shorter; corolla about 1 cm. long, violet, whiter at the base; legume 1.5–2 cm. long, 4–6-seeded. Meadows: B.C.—Calif.—Ida *Submont.* Je—Jl.

67. *L. psoraleoides* Pollard. Perennial, with a cespitose caudex, sub-acaulescent; stem 1–1.5 dm. high, densely villous with long white hairs; leaflets 5–7, oblanceolate, acute, 2–3 cm. long, long-villous; raceme dense, almost sessile, scarcely surpassing the leaves; bracts linear, scarious, corolla about 1 cm. long, violet-purple; banner shorter than the keel; legume 1.5 cm. long, few-seeded. Gravelly soil: Colo. *Submont.* Au.

68. *L. candicans* Rydb. Low cespitose perennial, densely white-silky throughout; stems ascending, 1.5–2 dm. high; leaflets about 7, 1.5–2.5 cm. long, oblanceolate, acute, mucronate, mostly conduplicate; raceme rather dense, 3–8 cm. long; calyx densely silky-villous; lower lip about 6 mm., the upper 4 mm. long; corolla dark blue; banner with a light brown spot, glabrous, about 7 mm. long; wings about 9 mm. long; pod 3–4-seeded. Dry hills and mountains: Mont.—Wyo. *Submont.* My.

69. *L. Evermannii* Rydb. Perennial and densely cespitose; stems about 1.5 dm. high, slender, erect or ascending, leafy, appressed-hairy; leaflets oblanceolate to linear-oblanceolate, 1–2.5 cm. long, densely canescens on both sides, raceme very short-peduncled, dense and short; bracts lanceolate, short; flowers 6–7 mm. long; calyx with spreading hairs; lips ovate-lanceolate, the lower about 5 mm. long, the upper 4 mm. long; corolla purplish blue; banner with a light spot, glabrous. Mountains: Ida.—Wyo. *Subalp.*

70. *L. monticola* Rydb. Stems numerous, 1–2 dm. high, grayish-strigose, leafy; leaflets 7–9, narrowly oblanceolate, 2–4 cm. long, acute or acuminate, grayish silky-strigose on both sides; racemes 3–6 cm., densely flowered; bracts 5–8 mm. long, subulate, equalling the calyx; calyx silky-villous; lower lip lanceolate, 7 mm. long, the upper ovate, 2-toothed, 6 mm. long, flowers dark blue, about 10 mm. long; petals subequal, banner with a light brown spot; legume 2 cm. long, 4–6-seeded. Rocky places in the mountains: Mont.—Wyo. *Mont.*—*Subalp.* Jl—Au.

71. *L. roseolus* Rydb. Stems ascending or decumbent, about 1 dm. high, sparingly strigose; leaflets about 7, narrowly linear-oblanceolate, acute, 1–2 cm. long, sparingly silky, short-strigose; raceme 2–4 cm. long; bracts subulate, shorter than the buds; calyx with short spreading hairs; lips broadly lanceolate, subequal, 5–6 mm. long; corolla nearly white, tinged with rose; pod perhaps 1.5 cm. long. Mountains: Wyo. *Mont.*

72. *L. caespitosus* Nutt. Cespitose, almost stemless; leaflets 5–7, oblanceolate, 1–2 cm. long, sparingly pubescent on both sides, with long hairs; raceme subsessile, 1–4 cm. long; bracts setaceous, equalling or slightly exceeding the buds; calyx silky; lower lip lanceolate, about 6 mm. long; upper lip ovate, 3–4 mm. long; corolla pale blue, lilac or white, 7–8 mm. long; legume 1–1.5 cm. long, about 4-seeded. Dry hills: Mont.—Colo.—Utah—Ore. *Plain*—*Mont.* Je—Au.

73. *L. Watsonii* Heller. Stems short, decumbent at the base, with few stem-leaves, long-silky, 1–2 cm. long; leaflets 5–7, narrowly oblanceolate, loosely ciliate on both sides, with in age brown hairs; raceme 5–12 cm. long; calyx long-

silky; lower lip lanceolate, 6 mm. long, the upper somewhat shorter and broader; corolla purplish, 8 mm. long; legumes about 1 cm. long, 4-seeded. *L. aridus utahensis* S. Wats. Mountain sides: Utah—Wyo.—Colo. *Submont.* Jl—Au.

74. *L. Cusickii* S. Wats. Stems densely strigose, 5–8 cm. long; leaflets 5–8, oblanceolate, densely canescent on both sides, 0.5–2 cm. long; racemes 2–3 cm. long; bracts subulate, about equalling the buds; calyx canescent; lower lip lanceolate, 5 mm. long, the upper lance-ovate, 4 mm.; corolla about 7 mm. long, purple; banner glabrous; pod about 1 cm. long, about 3-seeded. Sterile hill-sides: Ore.—Ida.—Utah. *Son.—Submont.* Jl.

75. *L. micensis* Jones. Branching from the base; branches decumbent, 5–15 cm. long, silky-villous, with long spreading hairs; leaflets obovate, oblanceolate or spatulate, 1–1.5 cm. long, silky-villous, with long spreading hairs, obtuse; racemes 2–5 cm. long; bracts lanceolate, persistent; calyx long-hairy; lips subequal, broadly lanceolate, 4 mm. long, corolla about 7 mm. long, reddish purple; legume about 1.5 cm. long, 3–4-seeded. Sandy or gravelly slopes: Nev.—Utah—Ariz. *Son.* Ap—My.

76. *L. brevicaulis* S. Wats. Subcaulescent; leaflets 7–8, cuneate-obovate or spatulate, rounded at the apex, sparingly ciliate on both sides, 7–15 mm. long; peduncles 2–5 cm. long; bracts lanceolate, short, persistent; calyx ciliate; lips ovate, subequal, 3–4 mm. long; corolla 6–8 mm. long, blue; pods 1–1.5 cm. long. On hills: Ore.—Calif.—N.M.—Colo. *Son.—Submont.*

77. *L. Kingii* S. Wats. Stem branched near the base, 1–1.5 dm. high, with silky-villous, spreading hairs; leaflets oblanceolate, 1–2.5 cm. long, silky-villous on both sides; racemes 1–3 cm. long; bracts lanceolate, shorter than the buds, persistent; calyx ciliate, lower lip 7–8 mm. long, oblong-lanceolate, the upper broadly ovate, corolla purplish, 8 mm. long; pod ciliate, 1 cm. long. *L. Sileri* S. Wats. *L. capitatus* Greene. Dry soil: Utah—Colo.—Ariz. *Son.—Submont.* Je—Jl.

78. *L. scaposus* Rydb. Stem branched at the base, 1–1.5 dm. high, sparingly ciliate; leaflets about 7, spatulate, 1 cm. long, sparingly silky-hirsute on both sides or glabrous above; raceme 1–4 cm. long; bracts lanceolate, short; calyx ciliate, the lower lip broadly lanceolate, 5 mm. long, the upper ovate; corolla purplish, 6 mm. long, paler at the base; banner shorter than the wings; legume 1 cm. long. Sandy soil: Colo. *Son.*

79. *L. rubens* Rydb. Stem ciliate, tinged with red, branched near the base, about 1 dm. high; leaflets 6–7, spatulate, 1–1.5 cm. long, ciliate on both sides or glabrous above, acute; raceme lax, 5–10 cm. long; bracts minute, subulate; calyx ciliate, the lower lip lanceolate, 5 mm. long, the upper barely 3 mm. long; corolla 7 mm. long; banner dark purple, with a yellow spot; wings and keel lighter. Sandy soil: s Utah. *L. Son.*

80. *L. pusillus* Pursh. Stem with branches decumbent near the base, stout, 0.5–2.5 dm. high, hirsute; leaflets 5–8, oblong-oblanceolate, glabrous above, sparingly hirsute beneath, 2–3 cm. long, rounded at the apex; racemes short-peduncled, 3–8 cm. long; calyx hirsute-ciliate; lower lip broadly lanceolate, 6 mm. long, the upper 4–5 mm. long; corolla tinged with rose or purple, or almost white, 8–10 mm. long; legume nearly 2 cm. long. Plains and sandy places: Wash.—Nev.—N.M.—Kans.—Sask. *Son.—Plain.* My—Jl.

4. TRIFOLIUM (Tourn.) L. CLOVER, TREFOIL.

Annual or perennial herbs. Leaves alternate, digitately 3-foliolate, rarely 5–7-foliolate, with toothed (in ours mostly finely denticulate) or rarely entire leaves. Flowers perfect, in heads or short dense racemes, bracted at the base. Calyx pedicelled, campanulate; lobes 5, elongate, often subequal, or the upper broader and more or less united. Corolla in ours purple, pink, or white; banner in ours straight; wings narrow and longer than the keel. Stamens 10, diadelphous; anthers all alike. Pod flattish or terete, included in the persistent corolla, often indehiscent; seeds few or solitary.

1. **T. macrocephalum** (Pursh) Poir. Perennial; stem 1-2 dm. high, stout, somewhat villous; leaflets 5-7, villous on both sides, or soon glabrate above, cuneate or obovate, strongly veined, 1-2 cm. long; head short-peduncled; calyx villous, lobes subulate, plumose, about 1 cm. long; corolla purplish, about 2 cm. long; pod stipitate. *T. megacephalum* Nutt. Wet meadows: Wash.—Ida.—Calif. *Son.* Ap—My.

2. **T. plumosum** Dougl. Perennial; stem erect, 3-8 dm. high, densely pubescent with short ascending hairs; leaflets linear to oblanceolate, 3-5 cm. long, acute, finely strigose; head elongate, 4-5 cm. long, 2 cm. thick; calyx-tube 4 mm. long, densely villous; teeth setaceous, 8 mm. long, plumose; corolla white or pink, about 15 mm. long. Meadows: Ida.—Ore. *Submont.*—*Mont.* Jl.

3. **T. pratense** L. Stem erect or decumbent, 2-6 dm. high, more or less pubescent; leaflets oval or obovate, 2-3 cm. long, rounded or retuse at the apex, often with a purplish spot in the middle; heads globose or nearly so, sessile; calyx-tube about 3 mm. long, sparingly hairy; teeth subulate, 3 mm. long; corolla about 1.5 cm. long. Meadows, roadsides, and fields: Newf.—Fla.—Calif.—B.C.; W.Ind.; cult. and nat.; native of Eu. My—S.

4. **T. eriocephalum** Nutt. Stem erect or decumbent, 2-4 dm. high; leaflets oblong, acute, more or less villous, 2-3.5 cm. long; flowers reflexed in age; calyx villous; tube 2 mm. long; teeth setaceous, 6-9 mm. long, plumose; corolla ochroleucous, about 12 mm. long. Wet prairies: Wash.—Ida.—Calif. *Submont.* My—Jl.

5. **T. villiferum** House. Stem slender, erect, 2.5-3.5 dm. high; leaflets oblong-oblanceolate, 2.5-4 cm. long, obtuse at the base, acute at the apex, pubescent on both sides; peduncles 6-13 cm. long; flowers reflexed in fruit, calyx densely villous, especially towards the apex; tube 2 mm. long; teeth subulate, equal, plumose, 3-4 mm. long; corolla pink-purple, 12-14 mm. long. Wet meadows: s Utah. *L. Son.* Je—Jl.

6. **T. macilentum** Greene. Stem 2-4 dm. high, slender, few-leaved; leaflets of the basal leaves ovate or broadly ovate, coarsely dentate, truncate or retuse, 2-3.5 cm. long, thin, glabrous; those of the stem-leaves narrowly lanceolate, acute; flowers reflexed in fruit; calyx sparingly villous; tube 2 mm. long; teeth setaceous, about 2 mm. long; corolla about 15 mm. long. Meadows: s Utah—n Ariz. *L. Son.*

7. **T. Rusbyi** Greene. Stems several, decumbent, 1-3 dm. long; leaflets oblong to obovate, 1-2 cm. long, glabrous or slightly pubescent beneath; peduncles about 1 dm. long; flowers in age reflexed; calyx villous, usually purple-tinged; tube 2 mm. long; teeth subulate-setaceous, 3-4 mm. long; corolla 10-12 mm. long. *T. longipes pygmaeum* A. Gray. Meadows: Ariz.—sw Colo.—Nev.—Calif. *Submont.*—*Mont.* Je—Jl.

8. **T. orbiculatum** Kenn. & McDerm. Stem 1-2 dm. high, short-pubescent; leaflets 1-2.5 cm. long, oblong or ovate, rounded or cuspidate at the apex, somewhat pubescent on the lower side; peduncles 4-10 cm. long; flowers reflexed in age; calyx dull green, 7-9 mm. long, short-pubescent; teeth 4-5 mm. long; corolla about 17 mm. long. Meadows: Mont. Je.

9. **T. confusum** Rydb. Stems erect, simple, 2-3 dm. high, glabrous below, sparingly strigose above; leaflets of the lower leaves oval and rounded at the apex, of the upper ones lanceolate, and acute, 2-3 cm. long, glabrous or nearly so; peduncles 5-7 cm. long; calyx-tube 2 mm. long, glabrous except the villous margin; teeth villous, 4-5 mm. long, subulate-setaceous. Meadows: s Utah. *L. Son.*

10. **T. harneyense** Howell. Stem 2-3 dm. high, glabrous or nearly so; leaflets linear, 3-6 cm. long, 2-5 mm. wide, denticulate; heads mostly solitary; calyx-lobes filiform, silky-hairy, longer than the scarious tube; banner with rounded apiculate apex. *T. tropicum* A. Nels. Moist valleys: Ida.—Ore. *Son.* Je.

11. **T. pedunculatum** Rydb. Stems 2-4 dm. high, rather slender, striate, glabrous or nearly so; leaflets oblanceolate to linear, acute, 2-3.5 cm. long;

peduncles 1 dm. or more long; flowers 10–12 mm. long; calyx-tube 2 mm. long, glabrous below, pubescent towards the throat; calyx-teeth subulate, the lower 3–3.5 mm. long. Valleys: Ida. *Submont.* Jl.

12. *T. longipes* Nutt. Stem solitary, erect, simple, 1–3 dm. high, sparingly strigose above; leaflets lanceolate or oblong, acute, 2–4 cm. long, or the lower elliptic-obovate, obtuse, glabrous above, pubescent beneath; peduncles 1–2 dm. long; calyx pubescent; tube 2 mm. long; teeth setaceous, 5–7 mm. long; corolla white, 10–12 mm. long. Meadows: Wash.—Ida.—Calif. *Submont.*—*Mont.* Je—Jl.

13. *T. latifolium* (Hook.) Greene. Stems strigose, decumbent, 1–2 dm. high; leaflets oval or obovate, 1–2 cm. long; peduncles 5–10 cm. long; calyx villous throughout; tube 2 mm. long; teeth subulate, about 3 mm. long; corolla 12–15 mm. long. *T. longipes latifolium* Hook. (?) *T. brachypus* Blankinship. Grassy slopes: Ida.—Wash.—Ore. *Submont.*—*Mont.* My—Je.

14. *T. Aitonii* Rydb. Stem 3–4 dm. high, glabrous below, strigose above; leaflets ovate, thin, obtuse or rounded and mucronate at the apex, 2–4.5 cm. long, glabrous above, sparingly hairy beneath; peduncles several, 1–2 dm. long; calyx pubescent throughout; tube 2 mm. long; teeth subulate, about 4 mm. long; corolla about 12 mm. long. Meadows: Ida. *Submont.* Je.

15. *T. Rydbergii* Greene. Stems usually erect, usually single, 2–4 dm. high, glabrous below, strigose above; leaflets lanceolate to oval, 2–4 cm. long or those of the basal leaves shorter and broader, usually acute, sharply denticulate, glabrous or slightly pubescent beneath; peduncles 5–10 cm. long; calyx pubescent; tube 2 mm. long; teeth subulate-setaceous, 4–5 mm. long; corolla white, about 15 mm. long. *T. longipes reflexum* A. Nels. Wet meadows: Ida.—Utah—*Colo.*—*Mont.* *Submont.*—*Mont.* Je—Au.

16. *T. Douglasii* House. Stem erect, strict, glabrous, 3–7 dm. high; leaflets veiny, glabrous, 2–6 cm. long; those of the lower leaves broader and shorter; peduncle 5–10 cm. long; head usually somewhat ellipsoid; flowers somewhat reflexed in fruit; calyx glabrous, veiny; tube nearly 3 mm. long; teeth subulate, about 5–6 mm. long; corolla 12–15 mm. long. *T. altissimum* Dougl., not Loisel. Low prairies and meadows: Wash.—Ida.—Calif. *Submont.* Je—Jl.

17. *T. Beckwithii* Brewer. Stem stout, erect, glabrous, 3–5 dm. high; leaflets elliptic or oval, the upper acute, the lower rounded at the apex, strongly veiny, glabrous, 2–4 cm. long; peduncles 1–2 dm. long; heads globose; flowers reflexed in age; calyx glabrous; tube nearly 3 mm. long; teeth subulate, 3–4 mm. long; corolla reddish purple. Wet meadows: S.D.—*Mont.*—*Ore.*—*Calif.* *Plain*—*Mont.* Je—Jl.

18. *T. Kingii* S. Wats. Stem erect, 2–3 dm. high, glabrous; leaflets of the lower leaves oval or elliptic, rounded at the apex, dentate, veined, glabrous, 1.5–4 cm. long, those of the upper leaves linear-lanceolate, sharply dentate, acuminate; peduncles 8–10 cm. long, glabrous; heads globose; flowers reflexed in fruit; calyx glabrous or nearly so; tube nearly 3 mm. long; teeth subulate, about 4 mm. long; corolla reddish purple. Wet meadows: Utah. *Mont.* Je—Au.

19. *T. hybridum* L. Stems several, glabrous, ascending or erect, 3–6 dm. high, leaflets broadly obovate, 1–3 cm. long, glabrous, rounded or rarely emarginate at the apex; peduncles 5–10 cm. long; heads globose; flowers reflexed in fruit; calyx glabrous; tube 1.5–2 mm. long; teeth subulate, 2–3 mm. long. Pastures and waste places: N.S.—Fla.—Calif.—Wash.—W. Ind.; cultivated and escaped, native of Eu. Je—S.

20. *T. repens* L. Stems creeping, 1–6 dm. long, glabrous; leaflets obovate, emarginate or obcordate, 0.5–2 cm. long; glabrous; peduncles 1–3 dm. long; flowers reflexed in age; calyx glabrous or essentially so; tube about 2 mm. long; teeth lance-subulate, 1.5 mm. long; corolla 7–8 mm. long. Waste places, roadsides and pastures: N.S.—Fla.—Calif.—B.C.; W. Ind.; cult. and escaped; native of Eurasia. Ap—O.

21. *T. nanum* Torr. Leaflets from linear-oblancoate to euneate-oblong, glabrous, strongly veined, 5–10 mm. long; peduncles 1–3 cm. long; heads 1–3-

flowered; flowers ascending; calyx glabrous; tube about 4 mm. long; teeth lanceolate, about 2 mm. long; corolla reddish purple or rose, nearly 2 cm. long. High mountains: Mont.—Colo.—Utah. *Mont.—Alp.* Jl—Au.

22. *T. Brandegei* S. Wats. Leaflets from broadly obovate to elliptic, rounded and short-mucronate at the apex, glabrous, 1–3 cm. long; peduncles 5–15 cm. long; heads loosely flowered; calyx glabrous or sparingly hairy, usually purple; tube 2 mm. long; teeth lance-subulate, 3–4 mm. long. High mountains: Colo. *Subalp.—Alp.* Jl—Au.

23. *T. Haydenii* Porter. Subcaulescent; leaflets broadly obovate or sub-orbicular, rather coarsely denticulate, 5–20 mm. long, glabrous; peduncles 5–15 cm. long, slender; flowers reflexed in age; calyx glabrous; tube fully 2 mm. long; teeth subulate, 3 mm. long. Mountain meadows and wet slopes: Mont.—Wyo. *Submont.—Mont.* Jl—Au.

24. *T. subcaulescens* A. Gray. Leaf-blades oval or elliptic, 1–2.5 cm. long, bright green and glabrous above, silky-canescens beneath; peduncles 2–5 cm. long, strigose; heads globose; flowers reflexed in age; calyx canescent; tube 2.5–3 mm. long; teeth subulate, about 2.5 mm. long; corolla purplish or salmon-colored, 10–12 mm. long. *T. nemorale* Greene. Open pine woods: Colo.—N.M. *Submont.* My—Je.

25. *T. gymnocarpon* Nutt. Leaflets oval to elliptic, glabrous above, strigose beneath, 5–10 mm. long; peduncles 1–4 cm. long, flowers reflexed in age; calyx strigose; tube about 1.5 mm. long, teeth subulate, 1.5–2 mm. long; corolla ochroleucous, about 8 mm. long; pod globose, hirsute, reticulate-rugose, dehiscent. Dry hills: Mont.—Colo.—Utah. *Submont.* My—Je.

26. *T. stenolobum* Rydb. Leaflets narrowly lanceolate or oblanceolate, 1.5–4 cm. long, finely strigose, very acute or acuminate; scape 1–1.5 dm. long; calyx-tube silky-strigose, 4–5 mm. long; teeth almost filiform, 7–9 mm. long, banner about 18 mm. long, obtuse, mucronate. Alpine peaks: Colo. *Subalp.—Alp.* Jl.

27. *T. attenuatum* Greene. Leaflets narrowly linear, attenuate, 1–4 cm. long, entire, with scattered hairs; peduncles 5–7 cm. long, sparingly strigose; calyx sparingly villous; tube 2.5–3 mm. long; teeth subulate, 2–3 mm. long; corolla reddish purple, 15–18 mm. long. High mountains: Colo. *Alp.* Au.

28. *T. bracteolatum* Rydb. Leaflets bright green, elliptic or lanceolate-oblong, acute at each end, 1–2.5 cm. long, strigose; peduncle 5–12 cm. long; calyx densely strigose; tube 3 mm. long; teeth subulate-filiform, 4–6 mm. long; corolla pale rose-purple or lilac, in age turning light brownish, about 1 cm. long. *T. hincinum* Rydb., not Greene. *T. petraeum* Greene. High mountains: Colo. *Subalp.—Alp.* Jl.

29. *T. anemophilum* Greene. Leaflets linear-oblanceolate, 1–2 cm. long, entire, acuminate; peduncles 1–3 cm. long; bracts short, 3–5 mm. long, lanceolate or ovate, acuminate or 3-dentate at the apex; calyx canescent; tube 2 mm. long; teeth subulate, about 4 mm. long; corolla reddish purple, about 15 mm. long. Dry rocky hillsides: Wyo. *Submont.* My—Je.

30. *T. lividum* Rydb. Leaflets linear-lanceolate or oblanceolate, very acute at both ends or cuspidate at the apex, 3–4 cm. long, glabrous above, sparingly appressed-hairy beneath; peduncles 1–1.5 dm. high; bracts linear-subulate to almost filiform; calyx-tube 2.5–3 cm. long; teeth subulate-filiform, 4–5 mm. long; corolla about 12 mm. long, light purple, with a darker keel. High peaks: Colo.—Wyo. *Subalp.—Alp.* Jl—Au.

31. *T. dasyphyllum* Torr. Leaflets linear-oblong, acuminate or attenuate at both ends, 1–3 cm. long; peduncles 2–10 cm. long; bracts linear-lanceolate, more or less scarious-margined; calyx loosely pubescent; tube 3 mm. long; teeth subulate, about 6 mm. long; corolla 12–15 mm. long. High mountains: Colo. *Submont.—Alp.* Je—Au.

32. *T. scarosum* A. Nels. Leaflets narrowly linear-oblong, short-acuminate at both ends, 1.5–2.5 cm. long; peduncles 4–6 cm. long; bracts linear-lance-

olate, scarious-margined, abruptly long-acuminate; calyx canescent-strigose; tube about 3 mm. long; teeth subulate, about 8 mm. long; corolla about 15 mm. long. Stony slopes: Wyo.—Utah—Mont. *Submont.*—*Mont.* Je—Jl.

33. *T. uintense* Rydb. Leaflets oblanceolate, acute and mucronate, entire, 1–2 cm. long, sparingly pubescent or glabrate above; peduncle about 6 cm. long; bracts lanceolate, 5–8 mm. long, slightly if at all scarious-margined; calyx only slightly pubescent; tube 2.5 mm. long; teeth subulate-setaceous, about 7 mm. long; corolla purple, about 15 mm. long. Mountains: Utah. *Subalp.*

34. *T. andinum* Nutt. Stems 1–5 cm. long, scapiform, with two leaves close under the heads, strigose-canescens; leaflets oblanceolate to cuneate-oblong, 5–10 mm. long, densely canescent on both sides; heads sessile; calyx canescent; tube 3–4 mm. long; teeth subulate, 4 mm. long; corolla ochroleucous, 8 mm. long, 1-seeded. Stony hillsides and mountains: Wyo.—Utah. *Submont.* Je—Jl.

35. *T. salictorum* Greene. Leaflets elliptic, acute or obtuse, 1–2 cm. long; peduncles 4–10 cm. long; bracts ovate or obovate, 5–10 mm. long, acute, more or less toothed or cleft at the apex; calyx-tube 3 mm. long; teeth unequal, the upper 1.5–2 mm., the lower 3–4 mm. long; corolla bluish purple, about 15 mm. long. High mountains: Colo. *Subalp.*—*Alp.* Jl.

36. *T. Parryi* A. Gray. Leaflets from oblanceolate to oval or obovate, usually sharply denticulate, 1–4 cm. long, acute or obtuse; peduncles 5–15 cm. long; bracts usually obovate, purple-veined and more or less toothed; calyx-tube 2.5–3 mm. long; teeth lanceolate, 2–3 mm. long; corolla purple, 15–17 mm. long. High mountains: Wyo.—Utah—Colo. *Subalp.*—*Alp.* Jl—Au.

37. *T. inaequale* Rydb. Leaflets oblanceolate or oblong, acute or obtuse, minutely denticulate, rather fleshy, 1.5–3 cm. long; peduncles 1–2 dm. long; bracts ovate or lanceolate, 5–7 mm. long; calyx-tube 3 mm. long; teeth unequal, the upper 2–2.5 mm., the lower 3.5–4 mm. long, lance-subulate; corolla purple, about 15 mm. long. Mountains: Utah. *Subalp.*—*Alp.*

38. *T. montanense* Rydb. Leaflets 0.5–2 cm. long, obovate, rounded and mucronate at the apex; peduncles 2–10 cm. long; ascending or decumbent; head 8–20-flowered; bracts obovate, often bluntly toothed, obtuse or acute; sepals subulate, the lower fully 3 mm., the upper scarcely 2 mm. long; corolla dark purple, about 12 mm. long. High mountains: Mont.—Wyo. *Subalp.*—*Alp.* Jl.

39. *T. spinulosum* Dougl. Stems decumbent, 3–5 dm. long, glabrous; leaflets oblong to oval, acute at each end, 1.5–2.5 cm. long; involucre about 8 mm. high, cleft about halfway down, again incised, with lanceolate spinulose teeth; calyx glabrous; tube 3 mm. long; teeth lanceolate-subulate, 5–7 mm. long; corolla 12–15 mm. long. Wet meadows: Wash.—Ida.—Calif. *Submont.* Je—Jl.

40. *T. Fendleri* Greenc. Stem erect or decumbent, 2–5 dm. high; leaflets of the lower leaves obcordate or obovate and emarginate, about 1 cm. long; leaflets of the upper leaves oblong or oblanceolate, about 3 cm. long; peduncles 5–15 cm. long; involucre 5–8 mm. high, whitish at the base; calyx glabrous, about 3 mm. long; teeth subulate, 4 mm. long, subequal. Wet meadows: Colo.—Utah—Ariz.—N.M.; Mex. *Son.*—*Submont.*

41. *T. oxyodon* Greene. Stem ascending, 1–2 dm. high; leaflets oblong to linear-oblanceolate, acute or the lower obtuse, 0.5–2 cm. long; peduncles 1–3 cm. long; involucres 6–7 mm. high; calyx glabrous; tube 2 mm. long; teeth subulate, 3 mm. long, corolla purple. Meadows: Colo. *Submont.* Au.

42. *T. variegatum* Nutt. Glabrous; stems decumbent or ascending, often branched; leaflets obovate or oblong-obovate, rounded or emarginate at the apex, minutely 5–10 mm. long; involucre 2–3 mm. high, cleft to about the middle and laciniately spinulose-lobed; calyx glabrous; tube 2 mm. long; teeth lanceolate, spinulose-acuminate, 2 mm. long; corolla dark purple, tipped with white. Grassy slopes: B.C.—Calif.—Utah—Mont. *Son.*—*Submont.* My—Au.

43. *T. subsalinum* Greene. Glabrous; stem hollow, flaccid, prostrate, 1–6 dm. long; leaflets obovate or obovate-oblong, mostly 1.5–2 cm. long, obtuse,

none emarginate; peduncles slender, twice as long as the leaves; involucre only slightly lobed, lacinate. Subsaline ponds: Nev.—Wyo. *Plain*.

44. *T. oliganthum* Steud. Glabrous; stem erect, slender, 2-4 dm. high, branched; leaflets of the lower leaves cuneate-oblong, of the upper linear or lance-linear, acute; involucre 3 mm. high, divided below the middle and laciniately spinulose-toothed; head few-flowered; calyx-tube 2.5 mm. long; teeth lanceolate, spinulose, acuminate, 2 mm. long; corolla dull purple, 6-7 mm. long. *T. pauciflorum* Nutt., not Urv. *T. filipes* Greene. Roadsides, hills, and banks: B.C.—Calif.—Ariz.; Mex. *Submont.* Ap-Je.

45. *T. cyathiferum* Lindl. Glabrous; stem prostrate or ascending, 3-5 dm. long; leaflets obovate-cuneate to elliptic, 1-2 cm. long; peduncles 5-10 cm. long; involucre white at the base, 8-10 mm. high, with rounded, spinulose dentate lobes; calyx glabrous; tube inflated, veiny, 3-4 mm. long; teeth ovate; corolla rose-colored. Moist places: B.C.—Ida.—Calif. *Submont.*

46. *T. microcephalum* Pursh. Annual; stems ascending or procumbent, branched, usually sparingly villous, 2-4 dm. high; leaflets obcordate or obovate-cuneate, emarginate, 5-15 mm. long, sparingly villous; peduncles 3-5 cm. long, involucre white at the base, with ovate acuminate lobes; calyx pubescent; tube and subulate teeth each about 2 mm. long; corolla about 6 mm. long, purplish. Hillsides and wet places: B.C.—L. Calif.—Nev.—Mont. *Submont.* My-Au.

47. *T. procumbens* L. Decumbent annual; stem 1.5-4 dm. long; leaflets obovate, truncate or emarginate at the apex, finely denticulate, 1-1.5 cm. long, the terminal one petiolulate; flowers reflexed in fruit; corolla yellow, striate, marcescent. Fields and roadsides: N.S.—Fla.—Tex.—Colo.—Minn.; adv. or nat. from Eu. My-S.

5. **MEDICAGO** (Tourn.) L. MEDICK, ALFALFA, LUCERNE, NONESUCH.

Mostly perennial herbs, sometimes shrubby plants. Leaves alternate, pinnately trifoliate, with commonly toothed leaflets. Flowers perfect, in elongate or head-like racemes. Calyx pedicelled, campanulate; lobes slender, nearly equal. Corolla purplish or yellow; banner oblong, subsessile; wings nearly oblong; keel obtuse, shorter than the wings. Stamens 10, diadelphous; anthers all alike. Stigma oblique. Pods curved or spirally coiled, often spiny, reticulate, indehiscent.

Pod unarmed.

Perennial, erect; corolla violet or blue; fruit spirally coiled in 2-3 turns.

Annual, prostrate; corolla yellow; fruit merely curved.

Pod prickly, densely spirally coiled, in 2-3 turns, corolla yellow.

1. *M. sativa*.

2. *M. lupulina*.

3. *M. hispida*.

1. *M. sativa* L. Perennial; stem decumbent or ascending at the base, sparingly hairy, in age glabrous, branched, 3-10 dm. high; leaflets oblong, oblanceolate, or cuneate-obovate, 1-3 cm. long, sharply denticulate towards the apex, obtuse or truncate, mucronate; racemes oblong, 1-5 cm. long; corolla 8-10 mm. long; pods pubescent, twisted into 2-3 spires. ALFALFA, LUCERNE. Fields and fence rows: Me.—Va.—Calif.—B.C.; Eu.; cult. and escaped. My-S.

2. *M. lupulina* L. Annual; stem prostrate, branched at the base, 3-6 dm. long, sparingly pubescent; leaflets usually broadly obovate or obcordate, denticulate above the middle, emarginate and mucronate, sparingly hairy, 4-15 mm. long; raceme dense, short and head-like, less than 1 cm. long; corolla about 3 mm. long; pod pubescent, strongly reticulate. NONESUCH. Fields and waste places: N.S.—Fla.—Mex.—Calif.—Wash.; nat. from Eurasia; rare in the Rocky Mountains. Mr-D.

3. *M. hispida* Gaertn. Annual; stem branched at the base, with ascending or spreading branches, glabrous or sparingly strigose; leaflets obovate, rounded to obcordate at the apex, crenulate above the middle, 1-1.5 cm. long; flowers in few-flowered heads; corolla yellow; pods several-seeded, reticulate, armed on the edges with curved prickles. *M. denticulata* Willd. BUR CLOVER. Waste places: N.S.—Fla.—Tex.—Mont.; Calif.—Wash.; adv. from Eu. Je-Au.

6. MELILOTUS (Tourn.) Hill. SWEET CLOVER, HONEY CLOVER.

Annual or perennial herbs, sweet-scented. Leaves alternate, pinnately trifoliate, with toothed leaflets. Flowers perfect, in elongate lax racemes. Calyx pedicelled, campanulate, teeth 5, nearly equal. Corolla yellow or white, free from the filaments; banner abruptly contracted at the base, subsessile; wings narrow, cohering with the short obtuse keel. Stamens 10, diadelphous; anthers equal. Stigma terminal. Pods short and thick, straight, often subglobose, indehiscent or nearly so, in ours reticulate.

Corolla white; banner a little longer than the wings.
Corolla yellow; banner about equalling the wings.

1. *M. alba*.
2. *M. officinalis*.

1. *M. alba* Desv. Stem 1-3 m. high, erect, branched, glabrous, or puberulent when young; leaflets obovate, oblanceolate or oblong, denticulate except at the base, 1.5-2.5 cm. long, usually truncate at the apex; corolla white, 4-6 mm. long. Waste places and roadsides: N.S.—D.C.—N.M.—Calif.—Wash.; adv. or nat. from Eurasia, or escaped from cultivation. My-S.

2. *M. officinalis* (L.) Lam. Stem erect, 1-3 m. high, glabrous, or slightly pubescent when young; leaflets from broadly obovate to oblong, sharply denticulate, except at the base, about 2 cm. long, rounded or obtuse at the apex; raceme lax and slender; corolla light yellow, 5-7 mm. long. Waste places and roadsides: N.S.—Fla.—Colo.—Utah—Ida.—Mont.; adv. or nat. from Eu., or escaped from cultivation. Je-S.

7. LOTUS (Tourn.) L. BIRD'S-FOOT TREFOIL.

Perennial herbs, mostly with decumbent stems. Leaves alternate, odd-pinnate, with foliaceous stipules. Flowers perfect, yellow, in head-like umbels; banner orbicular, spreading; keel prolonged into an incurved beak. Stamens 10, diadelphous; filaments dilated above; anthers equal. Pods elongate, linear, usually straight, dehiscent, many-seeded.

1. *L. tenuis* Waldst. & Kit. Perennial, with taproot; stem branched at the base; branches slender, widely spreading, prostrate, with assurgent tips, 1.5-5 dm. long; leaflets 3, narrowly oblong or oblanceolate, 6-15 mm. long; flowers capitate, 3-7; calyx-tube obconic; lobes linear-subulate, about as long as the tube; corolla yellow, about 1 cm. long; pod 2-2.5 cm. long, 2 mm. broad. *L. tenuifolius* (L.) Reich. *L. Macbridei* A. Nels. Bottom lands: Ida.; introduced from Eu. Je.

8. ACMISPON Raf.

Leafy-stemmed annuals. Leaves alternate, pinnately 1-5-foliate, with small gland-like stipules. Flowers perfect, usually solitary, on bracted axillary peduncles. Petals usually pinkish, slightly exceeding the calyx; claws equally approximate to each other; banner rounded; wings oblong; keel narrowed above into a rather short acute, incurved beak, equalling or exceeding the wings. Stamens diadelphous; filaments alternately dilated under the subequal anthers. Pods linear, straight or nearly so, somewhat compressed, readily dehiscent, many-seeded.

Leaves subsessile; petiolule of the terminal leaflet ascending.

Leaves distinctly petioled; petiolule of the terminal leaflet reflexed, or at least spreading.

1. *A. americanus*.
2. *A. elatus*.

1. *A. americanus* (Nutt.) Rydb. Stem 3-5 dm. high, silky when young, much branched, with strongly ascending branches; leaves 1-3-foliate; leaflets lanceolate or linear-lanceolate, acute, silky-villous, in age glabrate, 1-2 cm. long; peduncles 7-25 mm. long; bracts linear-lanceolate; calyx-teeth subulate, subequal, 4 mm. long, nearly equalling the pinkish corolla. *Hosackia Purshiana* Benth. *Lotus americanus* (Nutt.) Bishop. Prairies, especially in sandy soil: Minn.—Ark.—Tex.—Sonora—Ida. *Plavn—Submont.* Je—Au.

2. *A. elatus* (Nutt.) Rydb. Stem sparingly silky-villous, with ascending-spreading branches, 3-6 dm. high; leaves 1-3-foliate; lateral leaflets obliquely oblong-lanceolate, acutish or obtuse, 1-2 cm. long, silky-villous; terminal leaf-

let elliptic or oval; peduncles 1-3 cm. long; bracts ovate; calyx-teeth subulate, about 3 mm. long, one-fourth or one-third shorter than the whitish corolla. *Hosackia elata* Nutt. Sandy soil: Wash.—Ida.—Ore. Son.—Submont. Je—Jl.

9. *HOSACKIA* Dougl. BIRD'S-FOOT.

Perennial herbs, with leafy stems. Leaves alternate, regularly odd-pinnate, with foliaceous stipules. Flowers perfect, in bracted several-flowered umbels or heads. Calyx campanulate; lobes subequal. Banner broad, its claw remote from the others; wings partially coherent to the very obtuse keel. Stamens 10, diadelphous, the alternate filaments dilated below the anthers. Pods linear, straight, or nearly so, 5-20-seeded, tardily dehiscent.

1. *H. bicolor* Hook. Glabrous perennial; stem erect or decumbent at the base, 2-4 dm. high; stipules ovate, more or less scarious, leaves pinnate; leaflets 5-9, obovate to elliptic, 1-2 cm. long, obtuse or acute; peduncles 4-10 cm. long, 3-7-flowered; bracts usually lacking; flowers sessile; calyx-tube 4 mm. long, the lower three teeth subulate, 2 mm. long, the upper two lanceolate and more or less united; corolla light yellow or the wings white; pod 6-8 cm. long, glabrous. *Lotus pinnatus* Dougl. Wet places: B.C.—Ida.—Calif. Submont. Ap—Je.

10. *ANISOLÖTUS* Bernh. DEER-WEED.

Annuals or perennials, with leafy stems. Leaves alternate, pinnate, with an even number (2-10) of leaflets, which, however, are rather irregularly arranged on the rachis; stipules gland-like. Flowers solitary or in small umbels or heads, on axillary peduncles. Calyx campanulate; teeth or lobes nearly equal. Petals free from the staminal tube; banner ovate or rounded; wings oblong; keel acute or rounded at the apex. Stamens 10, diadelphous, the alternating filaments dilated above. Pod flat, linear, straight, dehiscent, mostly many-seeded.

Annual, plant villous; flowers subsessile in the axils of the leaves 1 *A. brachycarpus*.
Perennials: plant appressed-pubescent; flowers mostly several together, on a peduncle (except often in No. 2).

Leaflets closely crowded on the very short rachis, oblanceolate to linear, poduncles less than 5 cm. long, stem erect

Inflorescence 1-2-flowered, usually subsessile in the axils of the leaves; calyx-teeth equalling the tube 2 *A. Wrightii*.

Inflorescence 2-5-flowered, distinctly peduncled; calyx-teeth shorter than the tube 3 *A. puberulus*

Leaflets not crowded on the evident rachis, stem decumbent

Flowers about 1 cm. long, peduncles 1-2 cm. long, leaflets linear-oblong

Flowers 12-15 mm. long; peduncles 4-10 cm. long 4. *A. nummularius*

Leaflets linear to oblong, bracts longer than the calyx; pods divaricate or reflexed. 5 *A. longibracteatus*

Leaflets obovate or cuneate, bracts shorter than the calyx, pods erect or ascending 6 *A. rigidus*.

1. *A. brachycarpus* (Benth.) Rydb. Stem decumbent or prostrate, diffusely branched, 1-3 dm. long, densely villous; leaves about 2 cm. long, subsessile; leaflets usually 4, oval, 6-10 mm. long, densely villous on both sides; flowers solitary, sessile; calyx-lobes lance-subulate, about 4 mm. long; corolla yellow, 7-8 mm. long; pod oblong, about 1 cm. long, villous, 2-3-seeded. *Hosackia brachycarpa* Benth. *Lotus humistratus* Greene. Hills: s Utah—Ariz.—Calif. Son. Mr—Jl.

2. *A. Wrightii* (A. Gray) Rydb. Stems numerous, erect or ascending, grayish strigose; leaflets 3-6, crowded, grayish strigose, linear or linear-oblong, mostly acute, 1.5-2 cm. long; flowers usually subsessile in the axils of the leaves, solitary or 2 or 3, sometimes on 1-3-flowered peduncles; bracts 1-foliate, linear; calyx-teeth subulate, 4 mm. long; corolla about 15 mm. long, yellow or orange, turning red; pod linear, strigose, 2.5 cm. long. *L. Wrightii* Greene. Hills: s Colo.—N.M.—Ariz. Son.—Submont. My—Au.

3. *A. puberulus* (Benth.) Woot. & Standl. Stems erect, 2-3 dm. high, strigose; leaves sessile; leaflets from spatulate to linear, 7-15 mm. long, strigose; peduncles 2-4 cm. long, 2-5-flowered; bracts 1-3-foliate; calyx-teeth subulate, 2-3 mm. long; corolla about 1 cm. long, light yellow, tinged with salmon or pink;

12. *P. cuspidata* Pursh. Stems strigose or glabrate, erect, 4-6 dm. high, with spreading branches; leaflets 5, 2-4 cm. long, obovate to elliptic, glabrate above, grayish strigose beneath; spikes head-like, 2-5 cm. long; calyx strigose, enlarged in fruit; tube in flowers 4-5 mm. long, gibbous above; lobes ovate to lanceolate-acuminate, the upper two united half their length, 4 mm. long, the lower long-cuspidate, 6-9 mm.; corolla blue, 15-20 mm. long; pod strigose, about 8 mm. long, ovoid. Sandy soil, hillsides: Minn.—Ark.—Tex.—N.M.—Mont. *Plann.* Ap-Jl.

13. *P. esculenta* Pursh. Stem erect, 1-3 dm. high, hirsute; leaflets 5, 2-6 cm. long, obovate to oblong, glabrous above, strigose beneath; spike short and dense, 2-8 cm. long; calyx-tube about 5 mm. long, gibbous above, lobes in anthesis lanceolate, the upper four 6 mm. long, the lowest 8 mm.; corolla about 15 mm. long; body of the pod ovoid, 6 mm. long; beak 15 mm. long. Prairies and plains: Sask.—Wis.—Mo.—Okla.—Mont. *Plann.—Submont.* My-Jl.

14. *P. hypogaea* Nutt. Stem very short, strigose; leaflets 5-7, 2-5 cm. long, linear or linear-lanceolate, glabrous or nearly so above, strigose beneath; peduncles 1-5 cm. long, strigose; spike head-like; calyx-tube 4 mm. long, gibbous above; upper 4 lobes lance-subulate, 5 mm. long, the lowest broadly-lanceolate, in flowers 7-10 mm. long; corolla about 12 mm. long. Dry plains: Neb.—Tex.—N.M.—Mont. *Plann.* Je.

15. *P. megalantha* Woot. & Standl. Stem very short; leaflets 5-6, obovate, 1-3 cm. long, densely white-strigose beneath, less densely so above; peduncles 1-4 cm. long; raceme 2 cm. long; calyx-tube 5-6 mm. long, gibbous above; lobes all subulate. Hills. n N.M.—w Colo.—e Utah. *Son.* Je.

16. *P. mephitica* S. Wats. Stem very short; leaflets 5, obovate or spatulate, 1.5-2.5 cm. long, grayish strigose on both sides, rounded or retuse at the apex; peduncles 1-5 cm. long, hirsute; spike head-like; calyx-tube 8 mm. long, gibbous above; upper 4 lobes subulate, 6 mm. long, the lowest lanceolate, 8-10 mm. long; pod about 1 cm. long, with a straight beak. Arid regions: Ariz.—s Utah. *Son.* My-Je.

17. *P. castorea* S. Wats. Stem 1.5 dm. or less high, strigose-canescens; leaflets 3-5, broadly obovate-cuneate, rounded or retuse at the apex, grayish strigose on both sides; peduncles 2-5 cm. long, strigose; spike head-like; calyx-tube 3 mm. long, the upper 4 teeth subulate, 6-7 mm. long, the lowest 8-10 mm. long; corolla about 1 cm. long; pod obovoid, 8 mm. long; beak about 1.5 cm. long. Arid regions: s Utah—Ariz.—s Calif.—Nev. *Son.* My.

14. *PAROSËLA* Cav.

Perennial or annual herbs or shrubby plants, with glandular-punctate foliage. Leaves alternate, odd-pinnate, with small leaflets. Flowers perfect, in terminal or lateral spikes. Calyx campanulate, its lobes nearly equal. Corolla white, purple, or yellow; banner broad, long-clawed, auricled at the base; wings and keel usually longer than the banner, their claws adnate to the staminal tube. Stamens 10 or 9, monadelphous; anthers alike. Pods usually included in the calyx, indehiscent, 2-3-ovuled, but usually 1-seeded. [*Dalea* Willd.]

Wing- and keel-petals inserted at the base of the staminal tube; pods exceeding the calyx; shrubs. (XYLODALEA)

Calyx-lobes shorter than the tube, the upper two much broader than the rest.

Leaflets 1-7, oblong or elliptic.

Leaflets 5-11, linear or linear-oblancoale.

Calyx-lobes equalling the tube, all lanceolate, nearly similar.

Wing- and keel-petals adnate to or inserted on the staminal tube, some distance from the base, pod shorter than the calyx; mostly herbs, rarely shrubs (EUDALEA).

Stem and leaves glabrous.

Annual; spike dense, cylindric

Perennial, spike either rather lax or few-flowered.

Plant herbaceous; spike lax, elongate, several-flowered; bracts obovate, persistent, enclosing the calyx.

Plant shrubby; spike head-like, 2-10-flowered, very short; bracts ovate, deciduous.

Stem and leaves pubescent.

Calyx-lobes short, ovate, not subulate-tipped; spike lax; prostrate or decumbent villous herbs.

1. *P. Fremontii*.

2. *P. Johnsoni*.

3. *P. amoena*.

4. *P. alopecuroides*.

5. *P. enneandra*.

6. *P. formosa*.

7. *P. lanata*.

Calyx-lobes subulate-tipped, longer than the tube; plants erect or decumbent, with a short caespitose caudex; spike dense.

Leaves 3-foliolate.

Leaves 5-foliolate

Stem low, 1-2 dm. high, decumbent at the base, spike sessile or short-peduncled

Stem tall, 3-5 dm. high, with the upper leaves reduced and spike rather long-peduncled.

8. *P. Jamesii*.

9. *P. carnescens*.

10. *P. aurea*.

1. *P. Fremontii* (Torr.) Vail. Shrub with white stems; branches canescent-strigose, somewhat spiny; leaflets often somewhat decurrent on the slightly winged rachis, 5-10 mm. long; spike elongate; calyx strigose; lobes lanceolate, 2 mm. long; corolla indigo-blue; keel about 8 mm. long; banner 6 mm. long; pod ovoid; body 1 cm long, strigose. Rocky places: s Utah—Nev.—Calif. *L. Son. My-Je.*

2. *P. Johnsoni* (S. Wats.) Vail. Shrub, with light-colored bark; branches strigose; leaflets 8-15 mm. long, 1 mm. wide, strigose-canescens; spike 5-7 cm. long, lax; calyx finely puberulent or glabrous; tube 3-4 mm. long; lobes 2 mm. long, the upper ovate-lanceolate, the rest lanceolate; corolla bluish purple; keel 8 mm. long; banner slightly shorter; pod minutely strigose; body 8 mm. long. Rocky hills: Ariz.—s Utah—Nev. *Son. My.*

3. *P. amoena* (S. Wats.) Vail. Branched shrub; branches strigose; leaflets 7-11, narrowly linear, 6-8 mm. long, obtuse, strigose-canescens; spike loose, few-flowered; calyx pilose; tube 4 mm. long; teeth lance-subulate, 4 mm. long; corolla dark purple; keel 10 mm. long; banner slightly shorter; pod densely pubescent. Arid places: s Utah—Nev.—Ariz. *L. Son. Ap.*

4. *P. alopecuroides* (Willd.) Rydb. Annual; stem erect, glabrous, with ascending branches, 2-6 dm. high; leaflets 15-41, oblong, cuneate, or oblanceolate, 3-8 mm long, obtuse at the apex; spike 2-7 cm. long; bracts ovate to lanceolate, acuminate, hyaline-margined; calyx-lobes linear-lanceolate, long-acuminate, plumose; corolla 2.5-3 mm long, white, tinged with rose or lilac. *Dalea alopecuroides* Willd. *P. Dalea* Britton. Prairies: S.D.—Ill.—Ala.—Tex.—N.M. *Plain. Je-S*

5. *P. enneandra* (Nutt.) Britton. Perennial, with a taproot; stem simple below, branched above, 3-10 dm. high, flat-topped; leaflets 5-11, linear, linear-oblong, or oblanceolate, 5-10 mm long, glabrous, conspicuously glandular-dotted; spikes 2-11 cm. long; calyx silky; lobes filiform-subulate, plumose, about 6 mm. long; corolla white; banner about 12 mm., keel 15 mm long. *D. laxiflora* Pursh. Prairies: N.D.—Ia.—Mo.—Tex.—Colo. *Plain. My-Au.*

6. *P. formosa* (Torr.) Vail. Divaricately branched shrub, 3-6 dm. high; leaflets 9-13, glabrous, cuneate to oblong, 2-4 mm. long, thick, retuse at the apex, revolute; bracts acuminate, ciliate, 5 mm. long; calyx villous; teeth 8 mm., subulate-setaceous, plumose; corolla reddish purple; keel 12-15 mm. long; banner 7-8 mm. long. Dry soil: s Colo.—Utah—Ariz.—Tex. *Son. Ap-O.*

7. *P. lanata* (Spreng.) Britton. Stems branched at the base, decumbent, 2-6 dm. long, densely short-villous; leaflets 9-13, cuneate, 4-12 mm. long, obtuse, truncate or retuse, densely short-villous; spikes slender, 2-10 cm. long, many-flowered; bracts ovate, acuminate, 3-4 mm. long; calyx 3-3.5 mm. long, velutinous; lobes lanceolate, shorter than the tube; corolla purple, rarely white; keel nearly 5 mm. long; banner 3 mm. long. Dry soil: Kans.—Tex.—N.M.—Colo.; Mex. *Son. Je-Au.*

8. *P. Jamesii* (T. & G.) Vail. Stems silky-strigose, ascending or decumbent, 5-20 cm. high; leaflets obovate, 5-15 mm. long, appressed silky-canescens; spike short-peduncled, 2-3 cm. long, dense; bracts ovate, acuminate, 8-10 mm. long; corolla yellow, in age turning purplish; keel 10-12 mm. long; banner about half as long. *P. Porteri* A. Nels. Dry plains and hills: Colo.—Tex.—N.M. *Son.—Submont. My-Au.*

9. *P. carnescens* Rydb. Stems 2-4 dm. high, strigose-canescens; leaflets 3-7, oblong-obovate, sparingly silky-canescens, 5-12 mm. long; spike dense, oblong, 1-2 cm. long; bracts ovate, acuminate; corolla yellow, turning reddish;

keel about 8 mm. long, nearly twice as long as the banner. *Dalea nana elatior* "Torr."; Torr. & Coul., in part. *P. rubescens* Coul. & Nels., not *D. rubescens* S. Wats. Dry soil: Tex.—Colo.—Ariz. Son. Jl.

10. *P. aurea* (Nutt.) Britton. Stems few, strigose-canescens; leaflets 5-9, oblong, obovate, or oblanceolate, 6-18 mm. long, obtuse or mucronate, silvery-canescens; spikes 2-7 cm. long; bracts broadly ovate, short-acuminate; corolla yellow, not turning red or purple; keel about 12 mm. long, about twice as long as the banner. Plains and hills: S.D.—Mo.—Tex.—Colo. Plain. Je-Au.

15. PETALOSTEMON Michx. PRAIRIE CLOVER.

Perennial (all ours), or annual caulescent herbs, with glandular-dotted foliage. Leaves alternate, odd-pinnate. Flowers perfect, in spikes, not subtended by involucre. Calyx campanulate; teeth short and broad. Corolla white, purple, pink, or yellowish; banner broad, clawed; wing- and keel-petals similar to each other, narrower, distinct, inserted at the mouth of the staminal tube, between the stamens. Stamens 5, monadelphous. Pods short, indehiscent, mostly 2-ovuled, but 1-seeded.

Calyx glabrous except the teeth; corolla white.

Spikes compact, bracts longer than the buds; leaflets 1.5-2.5 cm. long.

Spikes looser, bracts shorter than the buds; leaflets usually less than 1.5 cm. long.

Calyx pubescent.

Corolla white or yellow; spike long and compact.

Leaves glabrous; corolla white or ochroleucous.

Leaves sparingly silky; corolla yellow.

Corolla rose or purple, very rarely white.

Leaflets mostly 5, linear or nearly so.

Pubescence of the calyx long silky-pilose, bracts lanceolate, acute; leaflets of

the lower leaves oblong, obovate, or cuneate.

Bracts glabrous or short-pilose.

Bracts silky, long-pilose.

Pubescence of the calyx dense and short; bracts ovate, villous, with a long

subulate glabrous acumination.

Leaflets linear, conspicuously glandular-dotted; bracts longer than the

calyxes.

Stem and leaves glabrous or sparingly hairy.

Stem and leaves densely villous.

Leaflets spatulate-linear, not glandular-dotted; bracts shorter than the

calyxes.

Leaflets 7-17, oblong.

1. *P. candidus*.

2. *P. oligophyllus*.

3. *P. compactus*.

4. *P. flavescens*.

5. *P. Searlsiae*.

6. *P. ornatus*.

7. *P. purpureus*.

8. *P. mollis*.

9. *P. pubescens*.

10. *P. villosus*.

1. *P. candidus* (Willd.) Michx. Stems several, erect, 3-7 dm. high, glabrous; leaflets 7-9, linear, oblong or oblanceolate, 1-3 cm. long, acute or mucronate, glabrous; spike 2-10 cm. long, compact; bracts subulate-tipped; calyx 3 mm. long; lobes triangular to lanceolate, shorter than the tube; corolla white. Prairies: Ind.—La.—Tex.—Sask. Plain. Je-Jl.

2. *P. oligophyllus* (Torr.) Rydb. Stems erect or decumbent, 3-10 dm. high, branched, glabrous; leaflets 5-9, firm, linear, oblanceolate, or elliptic, acute or mucronate, glabrous; spike oblong, becoming more or less cylindric and looser, 1-7 cm. long; bracts with filiform tips; calyx-lobes 3 mm. long, triangular, acute; corolla white. *P. gracilis oligophyllus* Torr. Plains, prairies, and cañons: Minn.—Ia.—Tex.—Ariz.—Alta. Plain—Submont. Je-Au.

3. *P. compactus* (Spreng.) Swezey. Stems few, glabrous, 3-8 dm. high; leaflets 5-7, oblong-oblanceolate or linear-oblong, 8-25 mm. long; spike long-peduncled, cylindric, compact, 4-15 cm. long, about 13 mm. thick; calyx silky-villous, 4 mm. long; teeth lanceolate, acute; corolla ochroleucous. *P. macrostachyus* Torr. Sand hills and plains: Neb.—Colo. Plain. Jl-Au.

4. *P. flavescens* S. Wats. Stem glabrous, about 3 dm. high; leaflets narrowly oblong, obtuse, 6-12 mm. long, sparingly silky; spike dense, long-peduncled, 2.5-4.5 cm. long; calyx silky-villous; teeth subulate. Dry rocky hills: s Utah. Son. Jl.

5. *P. Searlsiae* A. Gray. Stem glabrous, branched below, 3-5 dm. high; leaflets 5-7, linear-oblanceolate to cuneate or ovate, obtuse, rounded or retuse at

the apex, glabrous, 5-20 mm. long; spike oblong, dense, 2-4 cm. long; bracts lanceolate, shorter than the calyx, acuminate; calyx villous, 4 mm. long; teeth subulate; corolla rose-colored. Hills: Utah—Ariz. *Son.* Je.

6. *P. ornatus* Dougl. Stem 3-6 dm. high, glabrous, simple or slightly branched; leaflets 5-7, oblong to obovate, obtuse or retuse at the apex, 5-15 mm. long, glabrous; spike short and dense, 2-4 cm. long, about 1.5 cm. thick; bracts and calyx silky-pilose, with long brownish hairs, calyx-teeth triangular, subulate; corolla rose-colored. Mountain slopes: Ore.—Ida.—Nev. *Son.*—*Submont.* My-Jl.

7. *P. purpureus* (Vent.) Rydb. Stems several, erect or ascending, 3-10 dm. high; leaflets 3-5, narrowly linear, 8-20 mm. long, strongly involute; spikes oblong or cylindric, 1-5 cm. long; bracts oblanceolate, abruptly acuminate; calyx densely silky-villous, 3 mm. long; teeth triangular; corolla violet or purple, rarely white. *P. violaceus* Michx. Prairies, plains or hills: Ind.—Ark.—N.M.—Sask. *Plain*—*Submont.* Je-Jl.

8. *P. mollis* Rydb. Stems several, erect, densely villous, 3-4 dm. high; leaflets 5, densely short-villous, linear, 10-15 mm. long, 1.5-2 mm. wide, obtuse; spike cylindric or oblong, 2-4 cm. long; calyx densely silky-villous, yellowish or ferruginous; teeth lanceolate; corolla rose-purple. Dry plains and hills: Mont.—Colo. Je—Au.

9. *P. pubescens* A. Nels. Stem 1-2 dm. high, sublanate; leaflets 5, nearly glabrous above, sublanate beneath, 10-14 mm. long; spike oblong, 2-5 cm. long, less than 1 cm. thick; calyx 4-5 mm. long; lobes shorter than the tube; corolla light purple. Plains: Colo. *Plain*.

10. *P. villosus* Nutt. Perennial, with a taproot; stems several, ascending or decumbent, 3-6 dm. high, densely villous; leaflets 7-17, approximate, linear to oblong, silky-villous, 6-12 mm. long; spikes cylindric, 2.5-8 cm. long; calyx densely villous; teeth subulate; corolla rose-purple, pink, or rarely white. Sand hills: Minn.—Mo.—Tex.—Colo.—Sask. *Plain.* Jl-S.

16. *ROBINIA* L. LOCUST-TREE.

Shrubs or trees, often with spine-like stipules. Leaves alternate, odd-pinnate, with entire leaflets. Flowers in axillary or terminal racemes. Calyx campanulate, 5-lobed, the two upper lobes more united than the rest. Corolla white, pink, or purplish; banner with a broad reflexed blade; wings curved, free; keel-petals incurved, united at the base. Stamens 10, diadelphous, or the upper filament united with the tube up to the middle. Pods narrow, flat, short-stalked, many-seeded; seeds oblique, with a crustaceous coat.

Inflorescence, leaves and fruit glabrous.

Inflorescence and fruit hispid; leaves finely puberulent.

1. *R. Pseudacacia*.

2. *R. neomexicana*.

1. *R. Pseudacacia* L. Tree 6-35 m. high, with firm brown bark, and spreading branches; stipular spines 3-10 mm. long; leaflets 9-19, thin, 2.5-4.5 cm. long, elliptic or oval, glabrous; calyx finely silky-strigose; teeth triangular, 2 mm. long; corolla 15-20 mm. long, white, except a yellow spot on the banner; pods 5-10 cm. long, 10-15 mm. wide. (?) *R. coloradensis* Dode. Woods: Pa.—la.—Okla.; cult. and nat. as far as Ont.—Ida.—Utah. My-Jl.

2. *R. neomexicana* A. Gray. Tree 6-8 m. high, with ascending branches; stipular spines 5-20 mm. long, often curved; leaflets 9-19, elliptic, oval, or ovate, 2-3 cm. long, strigose-puberulent; calyx glandular-hirsute and strigillose; teeth lanceolate, or the upper two ovate, 3 mm. long; corolla about 2 cm. long, pale rose-colored; pod 5-8 cm. long, nearly 1 cm. wide. Along streams: Colo.—N.M.—Ariz.—Nev. *Submont.* My-Je.

17. *PETERIA* A. Gray.

Perennial herbs or undershrubs. Leaves alternate, odd-pinnate, with entire leaflets and the stipules transformed into diverging spines. Flowers drooping, in virgate racemes terminating the branches. Calyx tubular, gibbous on the upper side; teeth triangular-subulate or lanceolate, the upper two more or less

about 2 cm. long, usually mottled. *A. lentiginosus* Dougl. Arid regions: Wash.—Ida.—Utah—Calif. Son. My—Jl.

6. *C. araneosum* (Sheld.) Rydb. Stems 2–5 dm. long, decumbent or erect, strigose; leaflets 15–19, fleshy, obovate to oval, rounded or retuse at the apex, 7–12 mm. long; spike short, 12–15-flowered; calyx with a few scattered black hairs; tube 4–5 mm. long; teeth subulate, about 1.5 mm. long; corolla whitish, tipped with purple; legumes about 2.5 cm. long, sulcate on both sutures, strongly curved, often mottled. *A. araneosus* Sheld. Dry plains: c Utah. Son.—Submont. Je.

7. *C. salinum* (Howell) Rydb. Stems many, ascending or decumbent, 1–3 dm. high, sparingly strigose; leaflets 9–17, obovate to oblong, obtuse or retuse, 8–12 mm. long, glabrous or nearly so; peduncles shorter than the leaves; calyx-tube 3 mm. long; teeth subulate, less than 2 mm. long; corolla ochroleucous, about 1 cm. long; pod glabrous, ovate, short-acuminate, with the beak curved upwards. *A. salinum* Howell. Saline soils and river flats: Ore.—Ida. Son. Je.

20. ONIX Stev.

Cespitose perennials, with rootstocks or caudices. Stem mostly decumbent. Leaves alternate, odd-pinnate, with many leaflets. Flowers racemose, white or purplish. Calyx campanulate or hemispheric; lobes subulate. Pod mostly stipitate, membranaceous, inflated, but triangular in cross-section, perfectly 2-celled, the upper suture acute, the lower sulcate; seeds many.

1. *O. Mulfordae* (M. E. Jones) Rydb. Stems decumbent, 1–2 dm. long; leaflets 13–17, linear, 4–6 mm. long, glabrate; racemes 5–10-flowered; calyx strigose; tube campanulate or hemispheric, 2 mm. long; teeth subulate, 1–1.5 mm. long; corolla about 7 mm. long, white; pod strigose; stipe 2–3 mm. long; body 10–12 mm. long; upper suture straight. *Astragalus Mulfordae* M. E. Jones. Dry ground: Ida. Son. Je.

21. GEOPRUMNON Rydb. BUFFALO BEANS, GROUND PLUMS, BUFFALO PEAS, PRAIRIE APPLES.

Perennial tufted herbs, with decumbent or ascending stems. Leaves alternate, odd-pinnate; leaflets numerous, entire, not notched. Flowers perfect, in dense racemes; calyx deeply campanulate or nearly cylindric, 5-lobed; lobes nearly equal. Corolla white or purplish, rarely ochroleucous; banner with a rather narrow, erect blade, longer than the wings and keel; keel-petals wholly united, not produced into a beak. Stamens 10; filaments diadelphous. Pods globose or ellipsoid, fleshy, becoming spongy, 2-celled, the partition formed by the intruded lower suture, which meets the upper suture. Seeds numerous.

Pods pubescent, abruptly pointed.

1. *G. plattense*.

Pods glabrous, pointless.

Corolla purple, leaflets oblong to linear.

2. *G. crassicaarpum*.

Corolla yellowish-white, with purple keel; leaflets oval or obovate.

3. *G. succulentum*.

1. *G. plattense* (Nutt.) Rydb. Stems diffusely branched, 1–4 dm. long, decumbent, strigose; leaflets 13–23, oblong, elliptic or cuneate, 5–15 mm. long, acute, rounded or retuse at the apex; racemes few-flowered, head-like; calyx-tube strigose, 5 mm. long; teeth subulate, 2 mm. long; corolla about 15 mm. long, yellowish white, tipped with purple; pod ovoid, 1–1.5 cm. in diameter. *Astragalus plattensis* Nutt. Prairies: Ind.—Ala.—Tex.—N.D. Plain. Ap—Je.

2. *G. crassicaarpum* (Nutt.) Rydb. Stems strigose, branched, prostrate, 1–4 dm. long; leaflets 13–27, oblong to linear, 8–20 mm. long, acute or obtuse, strigose beneath, glabrous above; raceme few-flowered; calyx-tube about 5 mm. long, strigose, at least some of the hairs black; corolla violet-purple, 1.5–2 cm. long; pod subglobose, 1.5–2 cm. thick. *A. caryocarpus* Ker. *A. crassicaarpus* Nutt. Prairies: Man.—Mo.—Tex.—Mont. Plain. Ap—My.

3. *G. succulentum* (Richards.) Rydb. Stems prostrate, spreading, branched, 2–4 dm. long, finely strigose; leaflets 17–25, elliptic or broadly oblong, obtuse,

truncate or emarginate, 1-1.5 cm. long, strigose beneath, glabrous above; raceme short; calyx strigose, sometimes with dark hairs; tube 7-8 mm. long; teeth subulate, 2 mm. long; corolla 2 cm. long; pod rounded-ellipsoid, over 1.5-2 cm. in diameter. *A. succulentus* Richards. *A. prunifer* Rydb. Plains and hills: Sask.—Colo.—Mont. *Plain—Submont.* My-Je.

22. ASTRÁGALUS (Tourn.) L. LOCO WEED, MILK VETCH.

Perennial or annual herbs. Leaves alternate, odd-pinnate. Flowers perfect, racemose. Calyx campanulate to cylindric, 5-lobed; lobes usually distinctly unequal. Corolla purplish or white, or rarely ochroleucous; banner with an erect blade, usually longer than the wings and the keel; keel not beaked, its petals wholly united. Stamens 10; filaments diadelphous; anthers alike. Pods ovoid to oblong, leathery or woody, turgid, 2-celled, dehiscent; partition formed by the intruded lower suture. Seeds usually many.

Plants caespitose, subscapose, villous-pubescent; pods sulcate on both sutures.

I. MOLLISSIMI.

Plants with elongate leafy stems

Pods not sulcate or slightly so on the lower suture, round or nearly so in cross-section.

II. ULIGINOSI.

Pod deeply sulcate on the lower suture, cordate or triangular in cross-section.

Leaves and stems strigose or glabrate; pods several-seeded. III. HYPOGLOTTIDES.

Leaves and stem villous, pods few-seeded IV. SPALDINGIANI.

I. MOLLISSIMI

Pod glabrous, deeply sulcate.

1. *A. mollissimus*.

Pod villous, slightly sulcate.

Calyx densely villous, leaflets 6-12 pairs

Pods perfectly 2-celled, raceme elongate.

2. *A. Bigelovii*.

The cells of the pod confluent at the apex, raceme short.

3. *A. Thompsonae*.

Calyx sparingly nigrescent; leaflets 3-6 pairs.

4. *A. anisus*.

II. ULIGINOSI.

Pod straight or nearly so.

Calyx-tube 4-6 mm. long, 3-4 mm wide

Bracts linear-lanceolate, long-attenuate, the lower almost as long as the calyces;

calyx-teeth all narrow, subulate, fully half as long as the tube; pod glabrous

5. *A. canadensis*.

Bracts ovate to lanceolate, scarcely half as long as the calyces, calyx-teeth short, less than half as long as the tube, the upper broader; pod more or less hairy (except sometimes in the first)

Upper calyx-teeth only slightly broader than the lower; bracts lanceolate.

Calyx not black-hairy; pod not sulcate

6. *A. oreophilus*.

Calyx more or less black-hairy; pods somewhat sulcate on the lower suture.

7. *A. Mortoni*.

Upper calyx-teeth about twice as broad as the lower, broadly triangular at the base; pod not sulcate.

8. *A. spicatus*.

Calyx-tube about 3 mm long, less than 2 mm wide

9. *A. ursinus*.

Pod decidedly arcuate.

18. *A. palans*.

III HYPOGLOTTIDES.

Pod with appressed gray or black pubescence

Calyx-teeth short and broad; corolla purple.

10. *A. terminalis*.

Calyx-teeth subulate.

Corolla purple or pink, seldom white; calyx-teeth much shorter than the tube.

11. *A. striatus*.

Corolla sulphur-yellow, white, or pinkish, calyx-teeth almost equalling the tube.

Leaflets elliptic, appressed-pubescent

12. *A. sulphureus*.

Leaflets broadly obovate; pubescence looser.

13. *A. oreganus*.

Pod villous with long spreading hairs

Corolla ochroleucous, bracts broadly spatulate to linear, obtuse

14. *A. virgultulus*.

Corolla purple; bracts ovate-lanceolate or oblong-lanceolate, often acutish.

Calyx black-hairy; teeth decidedly shorter than the tube.

15. *A. goniatius*.

Calyx not black-hairy, teeth about equalling the tube

16. *A. agrestis*.

IV. SPALDINGIANI.

One species.

17. *A. Spaldingii*.

1. *A. mollissimus* Torr. Stems less than 1 dm. long, decumbent, densely villous; leaves mostly basal; leaflets 23-29, obovate to oval, 6-25 mm. long, silky-villous; racemes short; calyx-tube cylindric, silky, 7-9 mm. long; teeth subulate, about 3 mm. long; corolla bright purple, about 18 mm. long; pod cylindric, 2 cm. long, curved upwards. Prairies and plains: Neb.—Tex.—N.M.—Wyo.—(? Mont.). *Plain.* My-Jl.

2. *A. Bigelovii* A. Gray. Stems less than 1 dm. long, ascending or decumbent, densely villous; leaves mostly basal; leaflets 15-25, broadly obovate or oval, 7-20 mm. long, densely silky-villous; raceme short; calyx-tube 7-8 mm. long, villous; teeth subulate, 3 mm. long; corolla 15-18 mm. long, bright purple; pod elongate-ovoid, curved upwards, 1.5 cm. long. Plains: Tex.—Colo.—Ariz; Mex. *Son.* Ap-Je.

3. *A. Thompsonae* S. Wats. Stem very short, densely villous; leaflets 11-31, oblong to obovate, 4-8 mm. long, densely villous on both sides; racemes rather dense; calyx-tube cylindric, 8-10 mm. long; teeth subulate, 2-3 mm. long; corolla purple, nearly 2 cm. long; legume obliquely ovoid, somewhat curved, 12-16 mm. long, acuminate. Dry regions: Utah. *Son.* My.

4. *A. anisus* M. E. Jones. Stems short, usually less than 1 dm. long, silky-pubescent; leaflets 7-13, silky-pubescent, obovate or oval, 4-6 mm. long; peduncles longer than the leaves; calyx-tube broadly cylindric, 8 mm. long; teeth subulate, very short; pods oval, obtuse at each end, finely corrugated, usually somewhat sulcate on both sutures. Dry plains: Colo. *Son.*

5. *A. canadensis* L. Stem erect or ascending, 3-12 dm. high, sparingly strigose; leaflets 15-25, elliptic, oblong, or oblong-lanceolate, 2-4 cm. long, usually obtuse at the apex, strigose on both sides or glabrate above; peduncles 5-10 cm. long; raceme 5-20 cm. long; calyx-tube strigose, 5 mm. long; teeth subulate, the upper 1.5 mm., the lower 2 mm. long; corolla ochroleucous, about 12 mm. long; pod oblong, 1-1.5 cm. long. River banks and hillsides. Que.—Fla.—Utah—B.C. *Plain—Submont.* Je-Au.

6. *A. oreophilus* Rydb. Stem sparingly strigose, 3-6 dm. high; leaflets 7-23, oblong or elliptic, about 3 cm. long, strigose on both sides or glabrate above; inflorescence 5-10 cm. long; calyx-tube about 5 mm. long, gibbous above, white-pubescent; lower calyx-teeth subulate, about 1.5 mm. long, the upper lanceolate, shorter and slightly broader; pod oblong, about 1.5 cm. long and 5 mm. thick. Hills, among bushes: Colo. *Submont.* Jl-Au.

7. *A. Mortonii* Nutt. Stem 3-6 dm. high, sparingly strigose or glabrate; leaflets 9-21, elliptic or oval, obtuse, rounded, or emarginate at the apex, 1.5-3.5 cm. long, strigose beneath; peduncles 1-2 dm. long; raceme short and dense, 2-5 cm. long; calyx-tube 4-5 mm. long; lower teeth subulate, 1.5 mm. long, the upper ones lanceolate, 1 mm. long; corolla ochroleucous, 12-15 mm. long, pod cylindric, 1.5 cm. long, 4-5 mm. thick. River banks: B.C.—Mont.—n Calif. *Son.—Submont.* Je-Au.

8. *A. spicatus* Nutt. Stems 2-4 dm. high, strigose; leaflets oblong to oval, obtuse or rounded at the apex, 1-2.5 cm. long, strigose on both sides or glabrate above; peduncle 1-1.5 dm. long; flowers often reflexed; calyx-tube 6 mm. long; lower teeth subulate, 2 mm. long, the upper ones triangular, 1.5 mm. long; corolla ochroleucous, 12-15 mm. long; pod cylindric, 1 cm. long, 4-5 mm. thick. *A. Mortonii* Coult., not Nutt. Meadows: Mont.—S.D.—Wyo.—Nev.—Ida *Submont.—Mont.* Je-Au.

9. *A. ursinus* A. Gray. Stem erect, flexuose, 3 dm. high or more, striate, sparingly strigose; leaflets 11-15, obovate, emarginate, 8-10 mm. long, glabrous or nearly so; peduncles 3-6 cm. long; racemes 2-5 cm. long; tube about 3 mm. long; upper teeth triangular, 0.5 mm. long, the lower more subulate, nearly 1 mm. long; legume oblong, about 1 cm. long, terete, slightly curved. Valleys Utah. *Son.*

10. *A. terminalis* S. Wats. Stem slender, 1.5-3 dm. high, strigose-canescens; leaflets 13-15, linear-oblong to oblong-obovate, obtuse, 6-10 mm. long, strigose-canescens; racemes open; flowers reflexed; corolla purplish, about 1 cm. long; pod coriaceous, sessile, straight, narrowly oblong, about 12 mm. long. Gravelly banks: Mont. *Submont.* Jl.

11. *A. striatus* Nutt. Stems 1-4 dm. high, strigose, decumbent or ascending; leaflets 9-19, oblong or elliptic, acute or obtuse, 1-2 cm. long, grayish strigose; peduncles 7-10 cm. long; spike dense, 2-6 cm. long; calyx-tube 5 mm. long, strigose, with mixed black and white hairs; teeth subulate, 2-3 mm. long; corolla

12-14 mm. long; pod ovoid, 8-19 mm. long, strigose. *A. adsurgens* Hook., not Pall. *A. nitidus* Dougl. *A. Crandallii* Gand. Plains and hills: Sask.—Minn.—Colo.—Ore.—B.C. *Plain—Mont.* Je-Jl.

12. *A. sulphureascens* Rydb. Stems ascending, about 4 dm. high, angled, glabrous; leaflets 13-19, elliptic, obtuse or acutish, mucronulate, 12-30 mm. long; spike dense and elongate; calyx white-strigose, with scattered black hairs; tube about 5 mm. long; lobes almost filiform, 5 mm. long; corolla light yellow, white, or pinkish; banner 15-18 mm. long, much exceeding the wings and keel; pod about 1 cm. long, 3-4 mm. wide, strigose, with black hairs. Mountains: Colo.—Mont. *Submont.—Mont.* Je-Au.

13. *A. oreganus* Nutt. Stem ascending or erect, branched, grayish-canescens; leaflets 9-21, broadly obovate, 7-20 mm. long, canescent with crisp hairs on both sides; peduncles 5-8 cm. long; spike at first short, in age elongate, 10-20-flowered; calyx-tube about 6 mm. long, more or less black- and white-hairy; teeth subulate, 2 mm. long; corolla 16-18 mm. long; pods sessile, slightly curved. *A. ventorum* A. Gray. Sand hills: Wyo.—Ida. *Plain—Submont.* Je.

14. *A. virgultulus* Sheld. Stems 1.5-2 dm. high, erect or ascending, striate, glabrous or nearly so; leaflets 13-19, oblong or oblong-lanceolate, 5-8 mm. long, obtuse or acute, glabrous above, sparingly strigose beneath; peduncles 5-10 cm. long; spike short, 2-3 cm. long; calyx-tube 6-7 mm. long, black- and white-hairy; teeth subulate, 3-4 mm. long; corolla ochroleucous, 12-15 mm. long; pod 10-12 mm. long. *A. hypoglothus bracteatus* Osterhout. River banks: Colo.—Wyo. *Submont.* Je-Jl.

15. *A. goniatus* Nutt. Stems 1-2 dm. (rarely 3 dm.) high, strigose, decumbent or ascending, zigzag; leaflets 15-21, linear-oblong to elliptic, obtuse or retuse, 5-10 mm. long, sparingly strigose on both sides or glabrate; peduncles about 5 cm. long; spike globose or oblong, 2-3 cm. long; calyx-tube 6-7 mm. long, usually with black hairs; teeth 2-3 mm. long, subulate; corolla about 15 mm. long; pod villous, about 1 cm. long, ovoid. *A. hypoglothus* Richards., not L. *A. agrestis* M. E. Jones, not Dougl. Meadows and river valleys: Hudson Bay—N.M.—Utah—Ore.—B.C. *Plain—Mont.* Je-Au.

16. *A. agrestis* Dougl. Stems decumbent or ascending, about 2 dm. high, glabrous or nearly so; leaflets oblong or oblong-lanceolate, 7-15 mm. long, obtuse or retuse, sparingly strigose or glabrate; peduncles 5-10 cm. long; spikes oblong or globose, 2-3 cm. long; calyx-tube 5-6 mm. long; teeth subulate, 4-5 mm. long; corolla purple, 15-18 mm. long; pod as in the preceding. Meadows: Man.—Sask.—Mont. *Plain.* Je.

17. *A. Spaldingii* A. Gray. Stem 2-4 dm. high, villous; leaves 5-7 cm. long; leaflets 21-25, lanceolate or lance-linear, villous; peduncles 5-10 cm. long; spike oblong, 2-4 cm. long; calyx villous, tube 3-4 mm. long; teeth setaceous, 4-5 mm. long; corolla light yellow, 9-10 mm. long; pod villous, ovate, coriaceous, turgid, scarcely sulcate; cells 3-4-ovuled, but often only 1-seeded. Plains: Wash.—Ida—Ore. *Plain.* My-Jl.

18. *A. palans* M. E. Jones. Stems ascending, glabrous throughout; leaflets 17-25, obovate or elliptic, 6-15 mm. long, obtuse or retuse, glabrous; peduncles about 1 dm. long; racemes 6-10-flowered; calyx sparsely nigrescent; tube 4 mm. long; teeth 3 mm. long, subulate; corolla pink, about 15 mm. long; legume linear, acuminate, arcuate, sulcate on both sides, less so on the lower side; lower suture inflexed, forming a not quite complete septum. Canyons: Utah—Ariz. *Submont.* Je.

23. HAMOSA Medic.

Annual, biennial, or perennial herbs, with decumbent or tufted stems. Leaves alternate, odd-pinnate; stipules almost free and distinct; leaflets numerous, entire, usually truncate or notched at the apex. Flowers perfect, in short racemes, few. Calyx short-campanulate, 5-lobed; lobes subulate, nearly equal. Corolla usually purplish; banner with rather broad blade, erect; wings usually longer than the unbeaked keel. Stamens 10; filaments diadelphous; anthers

alike. Pods linear, laterally flattened, dehiscent, membranous, completely 2-celled by the intrusion of the lower suture. Seeds numerous.

Plant acaulescent, silvery white.

Racemes several-flowered; calyx-teeth triangular-lanceolate, about one-third as long as the tube.

Racemes 1-2-flowered, calyx-teeth elongate-lanceolate, more than half as long as the tube

Plant caulescent, not silvery.

Legume curved.

Plant glabrous or strigose

Pod less than 3 mm. wide, not mottled; corolla 5-6 mm long

Leaflets lanceolate or oblong, pod finely strigose 3 *H. austrina*.

Leaflets cuneate or oblong, emarginate; pod glabrous 4 *H. Nuttalliana*.

Pod 6 mm. wide, mottled, corolla about 1.5 cm long. 5 *H. amplexa*.

Plant hirsute, pod over 4 mm wide 6 *H. malacra*.

Legume straight.

Racemes short, subcapitate; corolla light bluish purple; leaflets oblong to obcordate, green.

Racemes elongate, lax; corolla cream-colored; leaflets narrowly oblong or linear, grayish strigose. 7 *H. leptocarpa*.
8 *H. atratiformis*.

1. *H. scaposa* (A. Gray) Rydb. Cespitose, nearly acaulescent perennial, leaflets 5-9, obovate or elliptic, silvery-cinereous, 7-12 mm. long; peduncles 8-10 cm. long; raceme 3-12-flowered; calyx cinereous, tube about 5 mm. long; teeth 1-1.5 mm. long; corolla purple, about 12 mm. long; pod oblong, slightly curved, cinereous-strigillose, 12-15 mm. long, 4 mm. wide. *Astragalus scaposus* A. Gray. Sandy soil: Wyo.—N.M.—Ariz.—Utah. Son. Ap-Je.

2. *H. calycosa* (Torr.) Rydb. Cespitose perennial, nearly acaulescent; leaflets 3-9, obovate, oblanceolate, or oblong, silvery-sericeous, 5-10 mm. long; peduncles 2-5 cm. long; raceme 1-3-flowered; calyx cinereous; tube 4 mm long; teeth lanceolate, 2-4 mm. long; corolla purple or cream-colored, about 1 cm. long; pod sessile, cinereous-strigillose, oblong, somewhat curved, 15-20 mm. long, 4 mm. wide. *A. calycosus* Torr. *A. brevicaulis* A. Nels. Gravelly soil: Ida.—Utah—Calif. Submont.—Mont. Ap-Jl.

3. *H. austrina* Small. Annual; stem branched at the base; branches ascending or decumbent, 1-4 dm. long, strigillose; leaflets 9-11, strigose on both sides, oblong or oval, 2-6 mm. long; peduncles 1-4 cm. long; raceme head-like, few-flowered; calyx-tube 2 mm. long; teeth subulate, 2 mm. long; corolla purplish, 5-6 mm. long; pod linear, 1.5-2 cm. long, strongly curved at the base. *A. Nuttallianus trichocarpus* T. & G. Plains and prairies: Tex.—Utah—Calif.; n Mex. Son. Ja-Je.

4. *H. Nuttalliana* (DC.) Rydb. Annual; stem simple or branched at the base, erect or ascending, sparingly strigillose or glabrate, 0.5-3 dm. high; leaflets 11-21, oblong, obovate or cuneate, usually notched at the apex, 2-10 mm. long, glabrous or sparingly strigose; peduncles 2-5 cm. long; raceme short and few-flowered; calyx-tube and the lance-subulate teeth each about 2 mm. long; corolla purplish, 5-6 mm. long; pod linear, about 2 cm. long, slightly curved, glabrous. *A. Nuttallianus* DC. Dry soil: Ark.—Colo.—Ariz.—Tex. Son. Mr-My.

5. *H. amplexa* (Payson) Rydb. Biennial or short-lived perennial; stems several, 3-4 dm. high, sparingly pubescent, erect or spreading, flexuose; leaflets 17-21, oblanceolate, truncate or retuse at the apex, 9-12 mm. long, 4-6 mm. wide; raceme 12-15-flowered; calyx-tube 6 mm. long, nigrescent; teeth linear, 2-3 mm. long; corolla violet; pod sparsely pubescent, 2-2.5 cm. long, 6 mm. wide, mottled along the dorsal suture, curved. *A. amplexus* Payson. Dry hillsides: w Colo. Submont. My.

6. *H. malacra* (A. Gray) Rydb. Perennial, cespitose; stems 1-3 dm. high, decumbent or erect, hirsute; leaflets 13-15, obovate, retuse, 1-1.5 cm. long, villous-hirsute; peduncles longer than the leaves; calyx-tube black-hairy, nearly 1 cm. long; teeth subulate, 3 mm. long; corolla purple, fully 1.5 cm. long; pod flattened laterally, strongly curved, loosely villous-hirsute, 3 cm. long, about 5 mm. wide, somewhat mottled. *A. malacrus* A. Gray. *A. obfalcatus* A. Nels. Hills: Calif.—Nev.—Ida.—Ore. Son. Ap-My.

7. *H. leptocarpa* (T. & G.) Rydb. Annual; stem erect, simple or branched at the base, with ascending branches, 1-3 dm. high; leaflets 9-19, glabrous or nearly so, oblong to cuneate, 3-8 mm. long, notched at the apex; peduncles 3-7 cm. long; raceme few-flowered; calyx-tube and the lanceolate teeth each 2 mm. long; corolla purplish, 8-10 mm. long; legume linear, 2.5-3 cm. long, straight or nearly so, glabrous. *A. leptocarpus* T. & G. Dry soil: Tex.—Colo.—Ark. Son. Mr—Ap.

7. *H. atratiformis* Rydb. Perennial; stem 2-3 dm. high, erect, branched, strigose; leaflets 13-19, oblong, strigose below, glabrous above, 4-6 mm. long; peduncles 5-7 cm. long; raceme lax, 2-3 cm. long; calyx black-strigose; tube about 2 mm. long; teeth subulate, 1 mm. long; corolla ochroleucous, about 7 mm. long; pod linear, straight, minutely strigillose. (?) *A. straturensis* M. E. Jones. Dry soil. s Utah. *L. Son.*

24. *TIUM* Medic.

Perennial caulescent herbs. Leaves alternate, with nearly free and distinct stipules; leaflets numerous, entire. Flowers perfect, in racemes. Calyx campanulate; teeth nearly equal, usually rather long. Corolla purple, white or ochroleucous; banner with a rather broad, erect, often notched blade. Stamens 10, diadelphous; anthers alike. Pod narrow, tapering at each end, more or less stipitate, usually membranous, 1-celled, obcordate, or inverted V-shaped in cross-section, the lower suture strongly sulcate, rarely with a narrow partial partition. Seeds numerous

Stipe exceeding the calyx; pod not incurved.

Pod not black-hairy; corolla white or ochroleucous.

Pod erect, glabrous.

Stipe much longer than the calyx.

Stipe scarcely exceeding the calyx.

Pod with a partial septum.

Pod glabrous; stipe 3-4 mm. long.

Pod strigose, stipe 1 mm. long

Pod without septum.

Pod reflexed

Plant villous; pod cordate in cross-section

Plant appressed-pubescent or glabrous; pod more or less triangular or inverted

V-shaped in cross-section

Pod 2-3 cm. long; corolla 15-20 mm. long

Calyx not black-hairy; pod straight

Calyx black-hairy; pod arcuate.

Pod less than 1.5 cm. long, flowers 6-8 mm. long.

Pod black-hairy; corolla violet or purple.

Stipe shorter than the calyx or almost none, pod incurved.

Pod mottled, plant green, very slender

Stem slender, spreading

Raceme 1-5-flowered, short; leaflets obovate or orbicular.

Raceme 5-10-flowered; leaflets linear

Stems stout, erect, raceme 5-15-flowered.

Leaflets obovate or orbicular.

Leaflets narrowly elliptic

Pod not mottled, plant cinereous

Pod appressed-pubescent.

Pod hirsute-villous, with spreading hairs

1. *T. eremiticum*.

2. *T. atropubescens*.

3. *T. obscurum*.

4. *T. arrectum*.

5. *T. Drummondii*.

6. *T. racemosum*.

7. *T. scopulorum*.

8. *T. Rusbyi*

9. *T. alpinum*.

10. *T. sparsiflorum*.

11. *T. owyheense*.

12. *T. variegatum*.

13. *T. naturitense*.

14. *T. humistratum*.

15. *T. desperatum*.

1. *T. eremiticum* (Sheld.) Rydb. Stems several, 2-4 dm. high, glabrous or nearly so; leaflets 13-19, 8-12 mm. long, oblong to obovate, obtuse; peduncles 8-10 cm. long; raceme 5-10 cm. long, loosely 5-10-flowered; calyx strigose, with black hairs; tube 5-6 mm. long; teeth subulate, 1-2 mm. long; corolla ochroleucous, 13-15 mm. long; stipe of the pod 10-12 mm. long; body oblong, 1.5-2 cm. long and 5 mm. thick. *Astragalus eremiticus* Sheld. *A. arrectus* M. E. Jones. *A. boiseanus* A. Nels. Mountains and hillsides: Ida.—Ariz.—Nev. Son.

2. *T. atropubescens* (Coult. & Fish.) Rydb. Stems several, erect, branched, strigose or glabrous; leaflets 16-25, oblong, about 1 cm. long, obtuse, glabrate above, strigose beneath; peduncles about 1 cm. long; raceme rather lax; calyx strigose, with black hairs; tube about 4 mm. long; teeth lance-subulate, 1.5 mm. long; corolla sulphur-yellow, 12-14 mm. long; body of the pod 15-18 mm. long,

3. *C. adanum* (A. Nels.) Rydb. Stems many, glabrate, striate, 2–4 dm. high; leaflets 13–25, rather thin, from oblong to broadly obovate, 7–14 mm. long, glabrous above, sparingly strigose beneath; racemes 5–15-flowered, short-peduncled; calyx partly black-hairy; pod narrowly ovoid, with short incurved, compressed apex, about 1 cm. long. *A. adanum* A. Nels. Hills: Ida. Je.

29. **CNEMIDOPHACOS** Rydb.

Cespitose perennials with a woody caudex; stems short, 1–2 dm. high. Leaves pinnate, with many narrow leaflets, cinereous; stipules slightly united with the petioles, but almost wholly united behind the stem, forming a sheath. Racemes strict and many-flowered. Calyx deeply campanulate; lobes linear-lanceolate, equalling the tube. Corolla yellow, with narrow petals. Pod coriaceous, oblong, ovoid, rounded below, somewhat depressed above, one-celled, without a partial partition or rarely with a rudimentary one; upper suture usually prominent

Pod with a rudimentary partition.

Pod without a partition

Calyx densely black-villous.

Calyx not black-hairy or with a few scattered black hairs

Calyx strigose with rather short hairs.

Corolla yellow

Corolla pinkish.

Calyx silky-pilose or hirsute with long loose hairs

Corolla purple; calyx-teeth 4–5 mm. long

Corolla ochroleucous; calyx-teeth 2 mm. long

1. *C. reventoides*

2. *C. reventus*

3. *C. flavus*

4. *C. confertiflorus*

5. *C. argillosus*

6. *C. urceolatus*

1. *C. reventoides* (M. E. Jones) Rydb. Stems adscurgent or erect, 1–1.5 dm. high, canescent-strigose; leaflets 15–25, oval to oblong, 6–12 mm. long, silvery-strigose on both sides; raceme head-like, 3–4 cm. long; calyx black-hairy; tube 4 mm. long; teeth 1 mm. long, obtuse; corolla yellowish, about 1 cm. long; pod oblong-ovoid, 8–10 mm. long, 6 mm. thick. *Astragalus reventoides* Jones. Dry hills and sage-brush flats: Mont. *Plain*. Je.

2. *C. reventus* (A. Gray) Rydb. Stems 2–4 dm. high, numerous, sparingly strigose; leaflets 21–37, oblong to linear, 1–1.5 cm. long, grayish strigose on both sides or glabrate above; raceme short; calyx black-villous; tube 5 mm. long; teeth subulate, 3 mm. long; corolla ochroleucous or whitish, nearly 2 cm. long; pod ovate-oblong, glabrous, acute, 15–20 mm. long, 7–8 mm. wide, neither suture very prominent. *A. reventus* A. Gray. Mountain sides: Wash.—Ida—Ore. *Plain*—*Submont.* Ap—My.

3. *C. flavus* (Nutt.) Rydb. Stems canescent-strigose, decumbent or ascending, 1–3 dm. high; leaflets 5–11, oblong to linear, grayish strigose beneath, slightly strigose or glabrate above, 1–3 cm. long; raceme rather dense; calyx strigose with white hairs; tube 4–5 mm. long; teeth subulate, about 2 mm. long; corolla yellow, 10–12 mm. long; pod ovoid, strigose, 12–15 mm. long, sessile. *A. flavus* Nutt. Dry plains. Wyo.—N.M.—Utah. *Submont.* Ap—My.

4. *C. confertiflorus* (A. Gray) Rydb. Stems erect, 1.5–3 dm. high, canescent-strigose; leaflets 11–13, narrowly linear, 15–25 mm. long; racemes 5–8 cm. long; calyx strigose, with white hairs; tube scarcely 4 mm. long; teeth subulate, 2 mm. long; corolla pale lilac, 1 cm. long; keel tipped with purple; legume oval-oblong, strigose, 10–12 mm. long. *A. confertiflorus* A. Gray. Dry places: Utah. *Son.*

5. *C. argillosus* (M. E. Jones) Rydb. Stems 1–2 dm. long, ascending, canescent-strigose with long hairs; leaflets 9–13, narrowly linear to oblong-linear, 1–2 cm. long; raceme short, dense; calyx silky-pilose with long hairs; tube 4 mm. long; teeth subulate-filiform, 4–5 mm. long; corolla about 1 cm. long, purplish; pod sessile, ovoid, obcompressed. *A. argillosus* M. E. Jones. Clayey soil: Utah. *Son.* My.

6. *C. urceolatus* (Greene) Rydb. Stems 3–4 dm. high, decumbent at the base, sparingly strigose; leaflets 11–21, narrowly linear, 1–3 cm. long, 1–3 mm. wide, sparingly strigose beneath, glabrate above; raceme short, head-like, densely-flowered; calyx densely silky-hirsute; tube 5 mm. long; teeth subulate, 2 mm.

long; corolla ochroleucous, 12 mm. long *A. urceolatus* Greene. Mountains: Colo. *Submont.* Je.

30. XYLOPHACOS Rydb. SHEEP-POD.

Perennial herbs, mostly low, usually copiously hairy, often canescent, with short stems. Leaves alternate, with nearly free and distinct stipules; leaflets few or more numerous, entire. Flowers in short, often subcapitate racemes. Calyx cylindric; lobes much shorter than the tube. Corolla purple, rarely ochroleucous or in one species crimson; banner narrow, slightly longer than the wings. Stamens 10; filaments diadelphous; anthers alike. Pods fusiform, or ovoid, leathery or woody, 1-celled, without partition; the lower suture sometimes slightly sulcate. Seeds numerous.

Pod strigose or glabrous

Exocarp of the fruit not spongy; stem evident, but often short

Pod more or less curved.

Plant sparingly hairy or glabrous, scarcely canescent; stem usually more or less elongate.

Calyx-tube about 10 mm long, white-hairy, plant sparingly silky

1. *X. stipularis*

Calyx-tube 5-8 mm long, black-hairy, plant strigose or glabrous

Pod 2-2.5 cm long, abruptly acute at both ends 2. *X. cuspidocarpus*

Pod 2.5-4 cm long, long-acuminato at both ends 3. *X. cibarius*

Plant densely canescent, with white silky appressed hairs, stem low, decumbent.

Pod elongate, dorsal suture distinctly sulcate.

Pod tapering at the base, not very thick

Calyx-teeth subulate, about half as long as the tube.

4. *X. aragallodes*.

Calyx-teeth less than half as long as the tube. 5. *X. amphioxys*

Pod not tapering at the bases

Calyx with black hairs, leaflets oval; corolla white or cream-colored.

6. *X. eurekaensis*.

Calyx without black hairs, leaflets rounded-obovate; corolla purple.

7. *X. Shortianus*.

Pod short-ovoid; neither suture distinctly sulcate

Pod mottled

Pod very strongly curved and vertically flattened at the middle; leaflets oval, acute, strigose 8. *X. Zionis*.

Pod slightly curved, leaflets oblong, rounded or truncate at the apex, villous 9. *X. puniceus*.

Pod not mottled, slightly curved and turgid

Calyx-teeth subulate, about half as long as the tube; leaflets oblong-oval 10. *A. argophyllus*

Calyx-teeth lanceolate, one-fourth as long as the tube; leaflets obovate 11. *X. untlensis*

Pod straight or nearly so; plant canescent

Pod obcompressed, somewhat triangular, ventral suture only prominent 12. *X. vespertinus*

Pod compressed; both sutures prominent.

13. *X. missouriensis*

Corolla purple, calyx with black hairs

Corolla white or ochroleucous with purple-tipped keel, calyx without black hairs

14. *X. cymboides*

Exocarp of the fruit spongy at least in age; plant sub-aculescent, less than 5 cm. high

Leaflets 7-11, rounded-obovate, obtuse.

15. *X. pygmaeus*

Leaflets 1-3, broadly lanceolate, acute.

16. *X. musiniensis*

Pod villous

Pod densely woolly, short-ovoid, plant canescent

Pubescence of the leaves strictly appressed

Leaflets elliptic to obovate, calyx-teeth one-fourth as long as the tube.

Leaflets obovate, obtusish; peduncles much shorter than the leaves

17. *X. Newberryi*.

Leaflets oblanceolate, acute; peduncles about equalling the leaves

18. *X. consuetus*.

Leaflets broadly obovate-cuneate, rounded, truncate, or retuse at the apex; calyx-teeth half as long as the black-villous tube.

19. *X. Watsonianus*.

Pubescence of the leaves loosely woolly

Stems 1 dm. long or less; bracts ovate or oblanceolate, only slightly exceeding the pedicels.

Leaflets broadly obovate, rounded at the apex; plant densely floccose.

20. *X. utahensis*.

Leaflets oblanceolate or oblong, acute, plant hirsute-villous.

Corolla ochroleucous, only the keel purple-tipped

21. *X. Purshii*

Corolla purple.

22. *X. glareosus*

Stems 2-4 dm. high; bracts subulate, at least half as long as the calyx

23. *X. inflexus*.

Pod sparingly villous, elongate; plant not canescent.

24. *X. Parryi*.

1. *X. stipularis* (M. E. Jones) Rydb. Stems 5-15 cm. long; leaflets 9-17, elliptic to obovate, 8-15 mm. long, rounded or retuse at the apex, silky beneath, glabrate above; raceme subcapitate, 5-12-flowered; calyx silky-villous with white hairs; tube about 1 cm. long; teeth lance-subulate, 4-5 mm. long; corolla purple, about 2 cm. long; pod 2.5-3 cm. long, 8-10 mm. thick, rounded at the base, short-acuminate at the apex, reticulate, glabrate. *Astragalus arietinus stipularis* M. E. Jones. Hills: s Colo. *Submont.* Je.

2. *X. cuspidocarpus* (Sheld.) Rydb. Stems 1-2 dm. high, decumbent at the base; leaflets 10-17, oblong to obovate, 8-12 mm. long, usually retuse, glabrous above, strigose beneath; raceme 7-9-flowered, subcapitate; calyx-teeth subulate, 1.5 mm. long; corolla ochroleucous, tinged with purple; legumes 2.5-3 cm. long, abruptly acute at both ends. *A. cuspidocarpus* Sheld. *A. thermalis* Greene. Hills: Mont.—n Wyo. *Submont.*—*Mont.* My-Je.

3. *X. cibarius* (Sheld.) Rydb. Stems 1-3 dm. long, decumbent at the base, strigose and striate; leaflets 11-17, oblong-obovate to nearly orbicular, rounded or retuse at the apex, 5-15 mm. long, glabrous above, strigose beneath; raceme short, 8-12-flowered; calyx-tube 6-8 mm. long; teeth subulate, 2 mm. long; corolla 12-18 mm. long, purplish or ochroleucous, with purple-tipped keel; pod cross-reticulate; lower suture sulcate. *A. cibarius* Sheld. *A. arietinus* M. E. Jones. Hills: Utah—Colo.—Mont. *Submont.*

4. *X. aragaloides* Rydb. Stems 1 dm. or less long, decumbent at the base; leaflets 11-19, lanceolate to elliptic, silky-canescens, 5-12 mm. long, acute, raceme short, 4-10-flowered; calyx ascending, strigose with black and white hairs; tube about 8 mm. long; teeth subulate, 3.5-4 mm. long; corolla purplish, about 2 cm. long; pod about 4 cm. long, tapering, rather deeply sulcate below, transversely reticulate; upper suture prominent. Arid regions. s Utah. *L. Son.*

5. *X. amphioxys* (A. Gray) Rydb. Stems spreading, 1-5 cm. long; leaflets 15-25, obovate or oval, 4-10 mm. long; raceme short, 8-12-flowered; calyx strigose with mixed white and black hairs; tube 7-8 mm. long; teeth subulate, about 2 mm. long; legume crescent-shaped, acute at both ends, 3-5 cm. long, strigose, cross-reticulate; lower suture deeply sulcate. *A. amphioxys* A. Gray. Gravelly hills: Tex.—Colo.—Utah—(? Ida.)—Ariz. *Son.*

6. *X. eurekensis* (M. E. Jones) Rydb. Stems less than 1 dm. high, sometimes almost wanting; leaflets elliptic or oval, about 1 cm. long, coarsely silky; calyx 6 mm. long; teeth subulate; corolla about 25 mm. long; keel tipped with purple; pod 3-5 cm. long, acuminate, appressed long-hairy, sulcate on both sutures. *A. glareosus* M. E. Jones. *A. eurekensis* M. E. Jones. Valleys and hillsides among sage brush: Utah. *Son.* My.

7. *X. Shortianus* (Nutt.) Rydb. Stem 1-10 cm. long; leaflets 11-15, obovate or oval, 1-2.5 cm. long; peduncles shorter than the leaves; raceme short, 5-15-flowered; calyx strigose, usually with white hairs; tube 8-10 mm. long; teeth lance-subulate, about 3 mm. long; corolla violet or purple, 18-25 mm. long; pod elongate-ovoid, arcuate, 3-5 cm. long, 12-14 mm. wide, sulcate on the lower suture, strigose. *A. Shortianus* Nutt. Plains and mesas: Neb.—Ariz.—Wyo. *Plain*—*Mont.* My-Je.

8. *X. Zionis* (M. E. Jones) Rydb. Stems spreading or prostrate, 5-30 cm. long; leaflets about 21, ovate to lanceolate, about 12 mm. long, acute; peduncles as long as the leaves; calyx-tube about 6 mm. long; corolla pink-purple; legume arcuate, abruptly long-acuminate, about 3 cm. long, slightly sulcate, triangular in cross-section; ventral suture prominent. *A. Zionis* M. E. Jones. Sandy or gravelly places: Utah. *Son.*—*Submont.* Mr-My.

9. *X. puniceus* (Osterhout) Rydb. Stems decumbent, about 4 dm. long, leaflets elliptic or oblong, 8-15 mm. long, rounded or retuse at the apex, ashy-pubescent beneath, sparingly strigose above; raceme about 10-flowered; calyx silky-hirsute; tube 5-6 mm. long; teeth subulate, 2 mm. long; corolla purple, about 15 mm. long; pod elongate-ovoid, 15-20 mm. long, 7 mm. wide, pubescent; lower suture slightly sulcate. *A. puniceus* Osterhout. Dry hills: Colo. *Submont.* Je.

10. *X. argophyllus* (Nutt.) Rydb. Stems short, decumbent, 5-10 cm. long; leaflets 15-17, lanceolate, 8-15 mm. long, acute; raceme 3-8-flowered; calyx-tube 8-10 mm. long; teeth subulate, about 4-5 mm. long; corolla 15-20 mm. long, purplish; pod oblong-ovoid, with a curved point, about 2 cm. long, transversely wrinkled, rounded on both sutures. *A. argophyllus* Nutt. Hills and valleys: Mont.—Wyo.—Utah—Nev. *Submont.* Je-Jl.

11. *X. uintensis* (M. E. Jones) Rydb. Stems prostrate or decumbent, 5-10 cm. long; leaflets lance-oblong to elliptic, 5-10 mm. long, acute; raceme short, few-flowered; calyx-tube about 8 mm. long; teeth subulate, 1.5-2 mm. long; corolla purple, 2-2.5 cm. long; pod ovoid, 2-2.5 cm. long, obcompressed; ventral suture slightly sulcate. *A. uintensis* M. E. Jones. Dry ground: Colo.—Nev.—Ariz. *Son.—Submont.* My-Je.

12. *X. vespertinus* (Sheld.) Rydb. Stems 4-6 cm. high, decumbent, striate; leaflets 11-13, obovate-elliptic, obtuse, 4-12 mm. long; raceme short, 3-6-flowered; calyx strigose with mixed black and white hairs; tube about 8 mm. long; teeth subulate, about 1.5 mm. long; corolla 2-3 cm. long, purplish; pod 2.5-3 cm. long, coriaceous, oblong, obcompressed-triangular in section; upper suture prominent. *A. vespertinus* Sheld. (?) *A. pangucensis* M. E. Jones. Dry hills: Colo.—N.M. *Submont.* My.

13. *X. missouriensis* (Nutt.) Rydb. Stems 5-10 cm. long; leaflets 11-21, elliptic to obovate, 5-15 mm. long; raceme short, 5-15-flowered; calyx-tube 7-8 mm. long; teeth subulate, 2-2.5 mm. long; corolla purple, 15-20 mm. long; pod oblong, 1.5-2.5 cm. long, 7-8 mm. broad, neither suture sulcate, rather prominent in age. *A. missouriensis* Nutt. Plains and hills: Sask.—Kans.—N.M.—Mont. *Plain—Mont.* My-Je.

14. *X. cymboides* (M. E. Jones) Rydb. Stems decumbent, 5-15 cm. long, and matted; leaflets 9-11, elliptic, obtuse, usually about 6 mm. long; calyx-tube about 6 mm. long; legume oblong-ovoid, 6 mm. wide, 16 mm. long, somewhat 4-angled, with rather prominent sutures in age. *A. cymboides* M. E. Jones. Gravelly or clayey ground: Utah. *Submont.* Je-Jl.

15. *X. pygmaeus* (Nutt.) Rydb. Plant almost stemless; leaflets 7-11, broadly oval, obovate, or orbicular, 5-10 mm. long; raceme short, subcapitate, few-flowered; calyx strigose with short, partly black hairs; tube about 8 mm. long; teeth 2 mm. long; corolla ochroleucous or purple, about 1.5 cm. long; pod obliquely ovoid, 2-3 cm. long, somewhat mottled, pulpy when young, in age with a membranous, transversely reticulate outer coat and a thicker inner one. *Phaca pygmaea* Nutt. *Astragalus Chamaeluce* A. Gray. *A. Cicadae* M. E. Jones. Hills: Colo.—Wyo.—Utah. *Submont.* My.

16. *X. musinensis* (M. E. Jones) Rydb. Plant nearly acaulescent; leaflets 1-3, lanceolate, or elliptic-lanceolate, 2 cm. or less long; pod ovate, 18 mm. long, 6-8 mm. broad, strigillose, with incurved acute apex, sulcate ventrally at the base; outer coat loose. *A. musinensis* M. E. Jones. Clayey slopes: Utah. *Submont.* Je.

17. *X. Newberryi* (A. Gray) Rydb. Subacaulescent; leaflets 3-7, obovate, 6-10 mm. long; raceme short, 2-6-flowered; calyx-tube about 12 mm. long; teeth subulate, 3 mm. long; corolla 2.5-3 cm. long, ochroleucous, tipped with purple; pod ovoid, about 2 cm. long, somewhat curved, not sulcate. *A. Newberryi* A. Gray. Dry hills: sw Colo.—N.M.—Ariz.—Utah. *Son.* Ap.

18. *X. consectus* (Sheld.) Rydb. Subacaulescent; leaflets 5-11, oblanceolate, acute, 1-2 cm. long; raceme short, 6-8-flowered; calyx-tube about 10 mm. long, teeth subulate, 3-4 mm. long; corolla about 2 cm. long, purplish or ochroleucous tipped with purple; legume ovoid, about 2.5 cm. long, with rather long beak, neither suture sulcate. *A. consectus* Sheld., in part. *A. eriocarpum* M. E. Jones, not S. Wats. Dry ground: Utah. *Son.—Submont.* Ap-My.

19. *X. Watsonianus* (Kuntze) Rydb. Subacaulescent; leaflets broadly obovate-cuneate, rounded or retuse at the apex, 10-15 mm. long; flowers capitate; calyx villous with black hairs; tube 12-15 mm. long; teeth subulate, 5 mm. long; corolla purplish, nearly 3 cm. long; pod 2.5 cm. long, strongly curved above

the middle, scarcely sulcate. *A. eriocarpus* S. Wats. Mountains: Nev.—(? Utah). *Submont.* My.

20. *X. utahensis* (T. & G.) Rydb. Stems usually less than 1 dm. long, densely floccose; leaflets 9–17, obovate or orbicular, rounded at the apex, 5–10 mm. long, densely white-floccose; raceme 3–10-flowered, dense; calyx densely villous; tube about 12 mm. long; teeth subulate, about 4 mm. long; corolla 25–28 mm. long, violet or purple; pod ovoid, about 2 cm. long, somewhat curved, only slightly sulcate on the sutures. *A. utahensis* T. & G. *A. nudisiliquus* A. Nels. PINK LADY-FINGERS. Hills and benchlands: Mont.—Wyo.—Utah—Nev. *Submont.* Ap—My.

21. *X. Purshii* (Dougl.) Rydb. Stems usually less than 5 cm. long, villous; leaflets 9–13, oblanceolate or oblong, acute, 8–15 mm. long, villous; calyx densely villous; tube about 1 cm. long; teeth subulate, about 3 mm. long; corolla 2–2.5 cm. long, ochroleucous; keel tipped with purple; pod ovoid, densely woolly, about 2 cm. long, slightly curved, scarcely sulcate. *A. Purshii* Dougl. *A. Booneanus* A. Nels., in part. Dry plains and hills: Mont.—Colo.—Calif.—B.C. Son.—*Submont.* My—Je.

22. *X. glareosus* (Dougl.) Rydb. Stems usually less than 1 dm. long; leaflets 11–17, oblong, canescent-hirsute, 4–10 mm. long, acute; peduncles very short; racemes 3–8-flowered; calyx-tube 8–9 mm. long; teeth subulate, 2 mm. long; corolla purple, about 2 cm. long; pod villous, ovoid, about 2.5 cm. long. *A. glareosus* Hook. *A. Booneanus* A. Nels., in part. Hills and flats: Wash.—Mont.—Wyo.—Utah. *Plain—Submont.* My—Je.

23. *X. inflexus* (Dougl.) Rydb. Stems 2–4 dm. long, decumbent, white-villous; leaflets 15–25, obovate or elliptic to oblanceolate, 7–15 mm. long, white-villous; raceme 5–10-flowered, capitate, calyx long-villous; tube 10–12 mm. long; teeth subulate-setaceous, 6–7 mm. long; corolla light purple, 20–25 mm. long; pod oblong-ovoid, strongly curved, villous, deeply sulcate on both sutures, 2.5 cm. long. *A. inflexus* Dougl. Plains and river-bars: Wash.—Mont.—Ore. Son.—*Plain* My—Je.

24. *X. Parryi* (A. Gray) Rydb. Stems 0.5–2 dm. long, hirsute-villous; leaflets 15–27, obovate or oblong, 4–15 mm. long, sparingly hirsute on both sides; raceme short, 6–10-flowered; calyx sparingly hirsute; tube 5–6 mm. long; teeth 4–5 mm. long; corolla ochroleucous, 15–18 mm. long; keel tipped with purple, pod 2.5–3 cm. long, 7 mm. broad, long-beaked, arcuate, hirsute; lower suture slightly more sulcate than the upper. Mountains: Wyo.—Colo.—n Tex. *Submont.—Mont.* My—Jl.

31. MICROPHACOS Rydb.

Subcinererous perennials, with very slender stems. Leaves pinnate, with 7–21 linear to oblong leaflets; stipules very broad, triangular, free from the petioles and only the lower more or less united with each other. Racemes many-flowered. Calyx short-campanulate, about 2 mm. long, with very short and broad teeth. Corolla purple, 5–6 mm. long, all petals strongly curved. Pod 6–8 mm. long, coriaceous, cross-wrinkled, wholly 1-celled, 6–7-ovuled, boat-shaped, *i. e.*, upper suture prominent, strongly curved, lower suture nearly straight or curved upwards, flat or slightly sulcate.

Pod slightly sulcate on the lower suture, transversely veined; leaflets narrowly linear-obtuse.
 1. *M. parviflorus*.
 Pod merely flattened on the lower suture, cross-wrinkled; leaflets linear-oblong or linear-cuneate, truncate or emarginate.
 2. *M. microlobus*.

1. *M. parviflorus* (Pursh) Rydb. Stem minutely strigose, 3–6 dm. high; leaflets 11–21; racemes very slender, lax; calyx-tube 1 mm. long; teeth triangular, 0.5 mm. long; corolla purplish, 5–6 mm. long; pod pendent, straight, ovoid, 5–7 mm. long. *Astragalus gracilis* Nutt. Plains and hills: N.D.—Tex.—Wyo. *Plain.* Je—Jl.

2. *M. microlobus* (A. Gray) Rydb. Stem branched, 3–4 dm. high, finely strigose; leaflets 7–17, minutely strigose; raceme lax, short; calyx-tube 1.5–2 mm. long; teeth triangular, 0.5 mm. long; corolla about 7 mm. long, purplish; pod

6-10 mm. long, ovoid. *A. microlobus* A. Gray. Plains and hills: S.D.—Kans.—Colo.—Mont. *Plain—Submont.* Je—Jl.

32. PTEROPHACOS Rydb.

Perennial glabrous or strigose herbs. Leaves alternate, odd-pinnate, with nearly free and distinct stipules; leaflets linear or linear-filiform, scarcely broader than the rachis. Flowers perfect, in short racemes. Calyx-tube oblong-campanulate, with short subulate-setaceous teeth. Corolla white; banner narrow. Stamens 10; filaments diadelphous; anthers alike. Legume woody, one-celled, 2-valved, the valves winged on the back, the sutures acute or even winged. Seeds many.

1. *P. tetrapterus* (A. Gray) Rydb. Stem about 3 dm. high, glabrous, striate; leaflets 15-21, narrowly linear, 12-20 mm. long, 1-2 mm. wide; raceme short, 5-9-flowered; calyx-teeth setaceous-subulate, about half as long as the tube; corolla white, about 15 mm. long; pod 3-4 cm. long, arcuate, glabrous, 4-winged, 8 mm. wide. *A. tetrapterus* A. Gray. Dry ground: s Utah. *Son.*

33. ATELOPHRAGMA Rydb.

Cauliscent leafy slender perennial herbs, with rootstocks. Stipules nearly free both from each other and from the petioles. Leaves pinnate, usually with numerous leaflets. Inflorescence a spike-like raceme. Calyx short, campanulate; lobes slender, subulate. Corolla white or purplish. Pod membranous or papery, more or less compressed laterally, in the typical species decidedly flattened and stipitate; dorsal suture intruding in the pod and forming a partial partition.

Pod stipitate, flat.

Partial partition broad, making the pod almost 2-celled 1. *A. Arthuri.*

Partial partition narrow, less than one-third the width of the pod.

Pod long-stipitate, glabrous at least in age.

Plant loosely short-villous 2. *A. aboriginum*

Plants appressed-silky or glabrous.

Leaflets oblong. 3. *A. Forwoodii.*

Leaflets linear

Plant grayish silky

Plant glabrous or with a few scattered hairs 4. *A. Hneare.*

Pod short-stipitate, hairy 5. *A. glabriusculum.*

Upper leaves not reduced; pod black-hairy.

Upper leaves reduced, often unifoliate, pod not black-hairy 6. *A. Macounii.*

7. *A. ibapense.*

Pod sessile, more turgid.

Racemes many-flowered; leaflets oblong; partition of the pod narrow

Racemes elongate; pod short-obovoid 8. *A. elegans.*

Racemes short, pod oblong. 9. *A. Shearii.*

Racemes few-flowered; leaflets linear; partition of the pod broad

10. *A. Brandegei.*

1. *A. Arthuri* (M. E. Jones) Rydb. Stems 3-4 dm. high, finely strigose; leaflets 21-35, oblong-elliptic, obtuse or retuse, 5-10 mm. long, glabrous above, minutely strigose beneath; racemes about 1 dm. long; calyx black-hairy; tube 5 mm. long; teeth 3 mm. long; corolla 10-12 mm. long, white; pod strigose; stipe 8-10 mm. long; body linear, 3-3.5 cm. long, tapering at both ends. *Astragalus Arthuri* M. E. Jones. Basalt hillsides: Ida. *Son.—Submont.* Je.

2. *A. aboriginum* (Richards.) Rydb. Stems 2-4 dm. high, short-villous; leaflets 9-15, linear-oblong to elliptic or lanceolate, 1-2 cm. long; raceme short; calyx more or less black-hairy; tube 3-4 mm. long; teeth 2-3 mm. long; corolla ochroleucous, 9-11 mm. long; pod glabrous; stipe 5-8 mm. long; body oblanceolate, acute at both ends, 1.5-2 cm. long; lower suture almost straight. *Astragalus aboriginum* Richards. Mountains: Sask.—Colo.—Nev.—Yukon. *Submont —Mont.* My—Je.

3. *A. Forwoodii* (S. Wats) Rydb. Stems ascending, minutely strigose, 1-3 dm. high; leaflets 9-17, oblong or oblanceolate, strigose on both sides or glabrous above, 1-1.5 cm. long; raceme short; calyx more or less black-hairy; tube 3 mm. long; teeth 2 mm. long; legume glabrous, flat; stipe 3-5 mm. long; body 2-2.5 cm. long, lunate-oblanceolate; lower suture usually somewhat concavely

curved. *Astragalus Forwoodii* S. Wats. Hills: S.D.—Wyo.—Mont. *Submont.—Mont.* Je-Jl.

4. *A. lineare* Rydb. Stem grayish strigose, often tinged with purple, 2-4 dm. high; leaflets 9-15, linear, 1-2 cm. long, 1-2 mm. wide, grayish strigose, raceme short; calyx densely black-hairy; tube 3 mm. long; teeth 2 mm. long, corolla about 8 mm. long, ochroleucous or tinged with purple; keel tipped with dark purple; legume glabrous, stipitate; stipe 4-5 mm. long; body 25-28 mm. long, convexly curved on both sutures, but much more strongly so on the upper. Dry slopes: Man.—Alta.—Yukon. *Boreal.—Mont.* Je.

5. *A. glabriusculum* (Hook.) Rydb. Stem 2-4 dm. high; leaflets linear or nearly so, 15-25 mm. long, glabrous or nearly so; raceme short, in fruit elongate, calyx black-hairy; tube 3 mm. long; corolla ochroleucous, 8 mm. long; keel tipped with dark purple; pod glabrous; stipe 4-5 mm. long; body 2 cm. long, lower suture straight or nearly so. *Phaca glabriuscula* Hook. *A. glabriusculum* A. Gray. Gravelly slopes: Alta.—S.D.—Wyo. *Submont.—Mont.* Je.

6. *A. Macounii* Rydb. Stem 5-6 dm. high, finely and sparingly strigose or glabrate; leaflets 9-17, very thin, oblong or oval, 15-25 mm. long, obtuse, glabrous above, sparingly strigose beneath; calyx black-hairy; tube about 3 mm. long; teeth 1 mm. long; corolla about 8 mm. long, cream-colored or white, tinged with purple; stipe of the pod 2-3 mm. long; body acute at both ends, 15-18 mm. long, 5 mm. wide. *Astragalus Macounii* Rydb. Mountains: B.C.—Alta.—Colo. *Submont.—Mont.* My-Jl.

7. *A. ibapense* (M. E. Jones) Rydb. Stem slender, grooved, minutely strigose; leaflets 1-7, elliptic or linear, the lower obtuse, the upper acute, 4-12 mm. long, minutely strigose, or the single one of the upper leaves 2.5-4 cm. long, raceme 1-3-flowered; calyx strigose; tube 2 mm. long; teeth 1 mm. long; corolla 6 mm. long, white; keel purple-tipped; pod short-stipitate, 12 mm. long, 3 mm. wide, densely strigose, flat; lower suture straight. *Astragalus ibapensis* M. E. Jones. Mountains: w Utah. Je.

8. *A. elegans* (Hook.) Rydb. Stem finely strigose or glabrous, erect or decumbent at the base, 2.5-6 dm. high; leaflets 9-17, oblong to linear, 15-20 mm. long, obtuse; raceme lax, 5-10 cm. long, in fruit even 15-20 cm. long; calyx black-hairy; tube 2.5 mm. long; teeth 1 mm. long; corolla 6-8 mm. long, purple, or ochroleucous and tinged with purple; pod clipoid, pendent, slightly inflated, sessile, black-hairy, 8-15 mm. long. *Phaca elegans* Hook. *Astragalus oroboides americanus* A. Gray. *A. minor* M. E. Jones. *A. eucomus* B. L. Robins. Mountains and woods: Lab.—Que.—S.D.—Colo.—Ida.—Alta. *Submont.—Alp.* Je-Jl.

9. *A. Shearii* Rydb. Stems slender, strigose and striate, about 2 dm. high; leaflets 13-19, 5-8 mm. long, oblong, obtuse or retuse at the apex, glabrate above, grayish strigose beneath; raceme short, 5-10-flowered; calyx-tube about 4 mm. long, strigose, partly with black hairs; teeth short; corolla reddish purple, nearly 1 cm. long; pod oblong, 12-14 mm. long, glabrous, reticulate, sessile. *Astragalus Shearii* Rydb. Mountains: Colo. *Mont.* Au.

10. *A. Brandegei* (Porter) Rydb. Stems adscurgent or ascending, branched, strigose; leaflets 9-11, distant, linear, obtuse, 5-15 mm. long, glabrous above, strigose beneath; raceme short, 2-5-flowered; calyx strigose; tube scarcely 2 mm. long; teeth 1 mm. long or less; corolla about 5 mm. long, white or cream-colored, tinged with purple; legume oblong, 10-12 mm. long, strigose. *A. Brandegei* Porter. Hills and bluffs: Colo.—Utah—Ariz. *Submont.* Je-Jl.

34. HOMÁLOBUS Nutt.

Perennial herbs, with rootstocks or woody caudices. Leaves alternate, odd-pinnate, or sometimes simple. Flowers racemose, purple or ochroleucous. Calyx campanulate. Keel obtuse. Pod several- or many-seeded, usually narrow, perfectly 1-celled, without trace of a partition, with both sutures prominent, usually more or less compressed, often flat.

Legumes decidedly flattened laterally.

Leaves simple or some of them rarely 3-foliate; plants pulvinate-caespitose; pod sessile. I. SIMPLICIFOLIUM.

Leaves several-foliate.

Pod sessile or short-stipitate; stipe seldom exceeding the calyx.

Legume oval, ovate, broadly oblong, or elliptic.

Pod without long black hairs.

Pod with long black hairs

Legume linear, 1.5 cm. long or longer.

Pod long-stipitate; stipe decidedly longer than the calyx.

Calyx not gibbous at the base, less than half as long as the corolla; pod membranous, leaflets linear or filiform

Calyx strongly gibbous at the base, more than half as long as the corolla, pod more coriaceous.

Legumes nearly terete

Pod sessile or short-stipitate; stipe if any shorter than the calyx.

Pod long-stipitate, stipe longer than the calyx.

VII. FLEXUOSI.

VIII. MACROCARPI.

I. SIMPLICIFOLIUM.

Calyx-teeth about half longer than the calyx-tube, corolla ochroleucous or whitish.

Calyx glabrous.

Calyx pubescent.

Leaves almost filiform, sparingly hairy, pungent-pointed; pods mottled.

Leaves narrowly linear-oblancoate, canescent, not pungent; pods not mottled.

Calyx-teeth about as long as the tube; corolla purple or pink.

Peduncles 1-flowered, bracts subulate, longer than the flowers.

Peduncles 3-10-flowered, bracts ovate to narrowly lanceolate, shorter than the flowers.

Pods long-acute; bracts narrowly lanceolate; leaves usually narrowly oblanceolate.

Pods abruptly acute, bracts short, ovate to lanceolate, very scarious, leaves oblanceolate or spatulate.

II. TENELLI.

Pod strictly sessile

Leaflets narrowly linear, often wanting

Leaflets oblong to oval

Stems densely caespitose, 1-2 dm. high; racemes short, few-flowered

Racemes 2-6-flowered, shorter than the leaves; leaflets oblong to oblanceolate,

acute, canescent

Racemes 5-12-flowered, exceeding the leaves; leaflets oblong to elliptic, green, glabrate above.

Stems more simple, 2 dm. high or more; racemes elongate.

Pods erect, on long pedicels.

Pods spreading or reflexed, on short pedicels.

Pods glabrous, plant canescent.

Pods hairy; plant green.

Pod short-stipitate

Corolla white, tinged with purple.

Both sutures of the pod curved

Lower suture of the pod straight.

Corolla ochroleucous.

Legume glabrous

Stipe rarely exceeding the tube of the calyx; leaves usually spreading in age, leaflets oblong to oval, obtuse and mucronate

Stipe of the mature legume usually exceeding the calyx-teeth, leaves strongly ascending, leaflets narrowly linear to linear-oblong, mostly acute.

Stipe 3-4 mm. long, leaflets linear or linear-oblong, stem usually conspicuously strigose, calyx-teeth half as long as the tube.

Stipe 5-7 mm. long; leaflets narrowly linear; stem glabrous or nearly so,

calyx-teeth usually nearly equalling the tube

Legume strigose.

III. DEBILES

Stem very slender, filiform and decumbent, pod sessile, ovate or oval

Stem erect or ascending, pods stipitate and long-acute at both ends

IV. CAMPESTRES.

Corolla ochroleucous, usually without any tinge of purple; upper leaves reduced to filiform phyllodes or the rachis greatly produced, without a terminal leaflet; canescent rush-like plants, with deep-seated roots and stem branched below the surface; calyx-lobes less than half as long as the tube.

Calyx more or less black-hairy; legumes tapering towards the base.

Calyx-lobes subulate, much longer than broad, leaves linear-subulate to linear, very acute.

12. *H. wingatanus* (S. Wats.) Heller. Stems 1-3 dm. high, finely strigose; leaflets 7-13, linear to oblong, 5-15 mm. long, sparingly strigose beneath, glabrate above; raceme 7-12-flowered; calyx strigose, with mixed black and white hairs; tube 1.5 mm. long; teeth subulate, 1 mm. long or less; corolla purplish, 6 mm. long; pod oblong, sessile, about 1 cm. long, 4 mm. wide. *A. wingatanus* S. Wats. Dry hills: N.M.—Colo.—Utah. *Submont.*

13. *H. Clementis* Rydb. Stem glabrate or slightly strigose, about 2 dm. high; leaflets 11-21, oblong or lanceolate, acute, 7-12 mm. long, glabrous above and sparingly strigose beneath; inflorescence 8-12-flowered; calyx-tube about 3 mm. long, strigose with black hairs, teeth lanceolate-subulate, about half as long; corolla bluish-purple, about 8 mm. long; pod oblong, about 1 cm. long, 3-4 mm. wide, black-hairy, with very short hairs. Mountains: Colo. *Mont.* Jl

14. *H. acerbus* (Sheld.) Rydb. Stems erect, strigose, branched, 3-4 dm. high; leaflets 5-7, linear, 4-20 mm. long, 1-2 mm. wide; raceme lax, 5-14-flowered; calyx strigose; tube slightly over 1 mm. long; teeth triangular-subulate, 0.5 mm. long; corolla 5 mm. long; legume glabrous; body oblong, 10-12 mm. long; stipe about 1 mm. long. *A. acerbus* Sheld. Hills: Colo.—N.M. *Submont.*—*Mont.* Je.

15. *H. Dodgeanus* (M. E. Jones) Rydb. Stems slender, flexuose, 1.5-6 dm. high, minutely pubescent; leaflets 9-11, narrowly elliptic to linear, 5-10 mm. long; racemes lax; calyx strigose, with black hairs; teeth triangular; corolla about 8 mm. long; keel purple-tipped; pod short-stipitate, linear-oblong. *A. Dodgeanus* M. E. Jones. Rocky slopes: Utah—Colo. *Submont.* My.

16. *H. dispar* Nutt. Stem 3-4 dm. high, sparingly strigose or glabrate; leaflets oblong to oval, rarely linear-oblong, obtuse, often mucronate, glabrous above, sparingly strigose beneath, 8-20 mm. long; raceme 5-15-flowered; calyx strigose or glabrous; tube 2 mm. long; teeth lance-subulate, 1 mm. long; corolla 8-10 mm. long; legume short-stipitate; body oblong, 10-13 mm. long, abruptly contracted into the stipe. Hills and mountains: w Neb.—Colo.—Utah. *Plain*—*Mont.* Je—Jl.

17. *H. tenellus* (Pursh) Britton. Stems erect, 2-4 dm. high, more or less strigose, branched; leaflets 6-10 pairs, linear or linear-oblong, glabrous above, more or less strigose beneath, 8-15 mm. long, 1-4 mm. wide; racemes 4-20-flowered; calyx strigose; tube nearly 2 mm. long; teeth triangular-subulate, 1 mm. long or less; corolla 8-9 mm. long; body of the pod oblong, 8-12 mm. long, 3-5 mm. wide, gradually tapering into the stipe. *A. multiflorus* (Pursh.) A. Gray. Hills and mountain sides: Sask.—Neb.—Colo.—Utah—Yukon. *Plain*—*Mont.* Je—Jl.

18. *H. stipitatus* Rydb. Stems slender, 3-4 dm. high, erect; leaflets 9-15, narrowly linear, 1-2 cm. long, 1-2.5 mm. wide, glabrous or sparingly strigose beneath; racemes lax, 5-20-flowered; calyx strigose; tube about 1.5 mm. long; teeth subulate, about as long; corolla 8-10 mm. long; body of the pod oblong, about 1 cm. long, 3 mm. wide, acute, gradually tapering into the stipe. Dry hills: Sask.—Minn.—S.D. *Plain.*

19. *H. strigosus* Rydb. Stems erect or ascending, 1-3 dm. high, strigillose; leaflets linear, acute, 8-12 mm. long, 1-2 mm. wide, thick, glabrous above, strigose beneath; raceme lax, 4-7-flowered; calyx strigillose; tube 1.5 mm. long, teeth subulate, less than 1 mm. long; corolla about 6 mm. long; body of the pod oblong, 7-8 mm. long, 3 mm. wide, rather gradually contracted into the stipe, which is about 3 mm. long. Dry places: Utah—Nev. *Son.*

20. *H. debilis* (Nutt.) Rydb. Stem 1-2 dm. long, sparingly strigose; leaflets cuneate-oblong or elliptic, truncate or emarginate, minutely strigose beneath; raceme short, subcapitate; calyx strigose, with grayish or blackish hairs, tube 2 mm. long; teeth subulate, about as long; corolla purple, 8-10 mm. long; pod black-hairy, with rounded base, acute. *A. debilis* (Nutt.) A. Gray. Along streams: Wyo.—Ida.—Yukon—Mack. *Boreal*—*Mont.* Jl.

21. *H. Bourgoyii* (A. Gray) Rydb. Stems numerous, decumbent or ascending, 0.5-3 dm. long, minutely strigose; leaflets oblong or elliptic to lance-linear, 4-12 mm. long, strigose; raceme lax, 3-10-flowered; calyx strigose, with black

hairs; tube about 3 mm. long; teeth 1-2 mm. long, subulate; corolla 8-10 mm. long, dark purple; pod lance-oblong, slightly stipitate, about 15 mm. long, black-hairy, with a round ridge on each side. *A. Bourgovi*. A. Gray. Mountains: Alta.—S.D.—Mont.—B.C. *Submont.*—Mont. JI—Au.

22. *H. campestris* Nutt. Stems often single, 2-4 dm. high, branched; rachis of the leaves 5-10 cm. long, sometimes broadened at the end into a narrowly oblanceolate blade, but usually long-attenuate; lateral leaflets of the lower leaves narrowly linear or linear-subulate, 5-30 mm. long, those of the upper leaves usually lacking; raceme lax, 3-10-flowered; calyx-tube 3 mm. long; teeth 1 mm. long; corolla about 1 cm. long; pod about 3 cm. long, 3-4 mm. wide, strigose. *A. campestris* A. Gray. *A. convallarius* Greene. Sandy plains and bench-land: Wyo.—Colo.—Utah. *Plain—Submont.* Je.

23. *H. junciformis* (A. Nels.) Rydb. Stems several, 2-4 dm. high, branched; leaves either reduced to a naked slender rachis, 4-7 cm. long, or bearing 5-7 distant linear-oblong or linear leaflets, 8-15 mm. long; raceme lax, 3-10-flowered; calyx-tube 3 mm. long; teeth triangular, 0.5 mm. long; corolla about 1 cm. long; pod about 3 cm. long, strigose. *A. junciformis* A. Nels. Sandy or stony plains: Wyo. *Submont.* Je.

24. *H. junceus* Nutt. Stems single or few, 3-6 dm. high, canescent-strigose, branched; lower leaves with 3-5, narrowly linear or oblanceolate-linear leaflets 1-3 cm. long, the upper usually reduced to the long slender rachis, curved at the tip; racemes 3-10-flowered, lax; calyx-tube 3 mm. long; teeth triangular, 1 mm. long or less; pod strigose, linear, 2.5-3 cm. long, 4 mm. wide. *A. junceus* A. Gray. *A. diversifolius* A. Gray. Sandy plains: Mont.—Wyo.—(? Colo.)—Ariz.—Ida. *Plain—Submont.* Je—Jl.

25. *H. decumbens* Nutt. Stems decumbent, 1-2 dm. high, sparingly strigose or glabrate; leaflets 7-11, narrowly linear-lanceolate, 5-10 mm. long, about 1 mm. wide, strigose on both sides; raceme short, but loose, 5-10-flowered; calyx-tube about 2 mm. long; teeth subulate, scarcely 1 mm. long; corolla ochroleucous, tipped with purple; pod linear, arcuate, 2-2.5 cm. long, 3 mm. wide, finely strigillose. *A. decumbens* A. Gray. Sandy plains: Wyo.—Mont.—Wash. Je—Jl.

26. *H. strigosus* (Coul. & Fish.) Rydb. Stems decumbent or ascending, 1.5-3.5 dm. high, strigose; leaflets 13-21, narrowly linear or linear, 1-2 cm. long, strigose on both sides; raceme slender, lax, 10-20-flowered; calyx-tube 2.5 mm. long; teeth subulate, of the same length; corolla 1 cm. long; pod sessile, linear, about 2 cm. long, 3-3.5 mm. broad, strigose. *A. strigosus* Coul. & Fish. *A. griseopubescens* Sheld. Dry ground: Mont.—Wash. *Plain—Submont.* Je—Jl.

27. *H. tenuifolius* Nutt. Stems decumbent, less than 2 dm. high, strigose-canescens; leaflets 7-13, linear or subulate, 5-15 mm. long, about 1 mm. wide, strigose-canescens on both sides; raceme short, lax, 3-8-flowered; calyx-tube campanulate, about 2 mm. long; teeth 0.5-0.7 mm. long; corolla 6-8 mm. long; pod linear, strigose, 12-15 mm. long, 2.5-3 mm. wide. *A. campestris* Coul. & Nels., not A. Gray. Dry hills and mountains: Mont.—Colo.—Utah. *Submont.*—Mont. Je—Jl.

28. *H. divergens* (Blankinship) Rydb. Stems numerous, 1-1.5 dm. (rarely 2 dm.) high, grayish strigose, decumbent; leaflets 9-15, canescent-strigose, linear to lance-oblong, 4-8 mm. long, 1-2.5 mm. wide; racemes 6-15-flowered; calyx strigose with dark hairs; tube scarcely 2 mm. long; teeth subulate, fully 1 mm. long; corolla 6 mm. long, white, purple-tinged, with purple veins and purple-tipped keel; pod linear, 12-15 mm. long, 2-2.5 mm. wide. *A. divergens* Blankinship. *Homalobus camporum* Rydb., in part. Dry hills and mountain tops: Mont.—Wyo.—Utah. *Plain—Mont.*

29. *H. serotinus* (A. Gray) Rydb. Stems ascending or erect, slender, 2-4 dm. high, strigose; leaflets 9-21, linear to lance-oblong, acute, glabrous above, strigose beneath, 1-3 cm. long, 2-4 mm. wide; racemes lax, 5-15-flowered; calyx-tube about 2.5 mm. long; teeth subulate, less than 1 mm. long; corolla purplish,

1 cm. long; keel with a deeply purple tip; pod 2-2.5 mm. long, 3 mm. wide, minutely strigose or in age glabrous. *A. serotinus* A. Gray. Mountain slopes: B.C.—Wash.—Mont. *Submont.* My-Jl.

30. *H. oblongifolius* Rydb. Stems ascending, branched, 2-3 dm. high, glabrous or nearly so; leaflets 11-19, usually oblong, but varying from elliptic to linear-oblong, 1-2 cm. long, 3-6 mm. wide, glabrous above, sparingly strigose beneath, rounded at the apex; raceme short, 5-10-flowered; calyx-tube 2-2.5 mm. long; teeth subulate, fully 1 mm. long; corolla 1 cm. long, white, tinged with purple; keel with a narrow dark-purple tip; pod 2-2.5 cm. long, strigose, 4 mm. wide. Mountains: Colo. *Mont.* My-Jc.

31. *H. decurrens* Rydb. Stems erect, 3-4 dm. high, slightly strigose and angled; leaflets 11-15, 2-4 cm. long, linear-oblong to oblanceolate, sparingly strigose below, glabrate above; racemes slender, lax, 5-10-flowered; calyx-tube about 2.5 mm. long; teeth nearly 2 mm. long and subulate; pod fully 2 cm. long and 3 mm. wide, at length often glabrous. Wooded hills: Colo. *Mont.* Jc-Au.

32. *H. paucijugus* Rydb. Stems 1-2 dm. high, sparingly strigose; leaflets 1-5, the lateral ones lanceolate to linear-subulate, 1 cm. or less long, glabrous above, sparingly strigose beneath, or none, the terminal one 1-2 cm. long, linear or linear-ob lanceolate; racemes short, 3-6-flowered; calyx strigose with black hairs; tube about 2 mm. long; teeth subulate, fully 1 mm. long; pod 12-15 mm. long, 2 mm. wide. Sheltered places in the mountains: Utah. *Mont.—Subalp.*

33. *H. microcarpus* Rydb. Stems decumbent, about 1 dm. high, strigose; leaflets 9-15, elliptic to linear, 5-15 mm. long, 1-3 mm. wide, glabrous above, sparingly strigose beneath; racemes short, 3-8-flowered; calyx strigose with black hairs; tube about 2 mm. long; teeth about 1 mm. long, subulate; pod 12-18 mm. long, 3 mm. wide. *H. camporum* Rydb, in part. Mountains: Colo. *Submont.—Mont.*

34. *H. humilis* Rydb. Stems 2-10 cm. long, grayish strigose, decumbent or spreading; leaflets 11-15, oblong, 3-6 mm. long, about 2 mm. wide, grayish strigose beneath, glabrate above; raceme short, 3-8-flowered; calyx strigose with black hairs; tube 1.5-2 mm. long; teeth triangular or triangular-subulate, 1-1.5 mm. long; corolla purple, 7-8 mm. long; pod about 1.5 cm. long, 3 mm. wide. Mountains: Utah. *Mont.—Subalp.*

35. *H. Palliseri* (A. Gray) Rydb. Stems adsurgent, 2-4 dm. high, sparingly strigose; leaves 8-12 cm. long; leaflets 9-19, linear or lance-linear, sparingly strigose below, glabrate above, 1-2 cm. long; raceme 7-12-flowered, lax; calyx strigose with black hairs; tube 2.5 mm. long; teeth triangular-subulate, 0.5 mm. long; pod linear, about 1.5 cm. long, 2 mm. broad, glabrous, tapering at both ends. Mountains: Alta—B.C.—Wash.—Mont. *Submont.* Jl.

36. *H. hylophilus* Rydb. Stems slender, leafy, sparingly strigose; leaflets 13-25, elliptic to lance-oblong, 1-2 cm. long, glabrous above, sparingly strigose beneath; raceme short, 6-12-flowered; calyx strigose, with dark hairs; tube 3 mm. long; teeth subulate, 1-1.5 mm. long; corolla about 1 cm. long, white, tinged with purple at the tip; keel purple-tipped; pod linear, 2-2.5 cm. long, 3-4 mm. wide. Open woods: Mont.—Wyo.—Utah—I da. *Submont.—Mont.* Jc-Au.

37. *H. stenophyllus* (T. & G.) Rydb. Stem erect, glabrous, 5-7 dm. high; leaflets 9-17, narrowly linear, glabrous or sparingly strigose, 1-1.5 cm. long, 1-2 mm. wide; raceme lax, many-flowered; calyx-tube 3-4 mm. long; teeth triangular, 1 mm. long; corolla ochroleucous or white, about 2 mm. long; stipe of the pod about 1 cm. long; body oblong, about 2 cm. long, 4 mm. wide. *A. stenophyllus* T. & G. Plains: Mont.—B.C.—Ore —(? Utah). *Son.—Plain.* Je.

38. *H. Episcopus* (S. Wats.) Rydb. Stems glabrous or slightly appressed-hairy, 4-6 dm. high, branched; leaflets 0-7, narrowly linear, 8-12 mm. long, sparingly strigose; raceme lax; calyx strigose, with more or less blackish hairs; tube about 4 mm. long; teeth subulate, about 1 mm. long; corolla reddish purple, 12-15 mm. long; pod glabrous; stipe 5-8 mm. long; body linear-ob lanceolate,

2.5-3 cm. long, about 5 mm. wide. *A. Episcopus* S. Wats. *A. Coltoni* M. E. Jones. Hills: Utah. *Son.*

39. *H. collinus* (Dougl.) Rydb. Stems erect, cinereous-pilose; leaflets 15-23, linear or linear-oblong, obtuse or retuse, 7-15 mm. long, villous-hirsutulous beneath, glabrate above; raceme 5-10 cm. long; calyx villous; tube about 8 mm. long; lower teeth lance-subulate, the upper triangular, all about 2 mm. long; corolla ochroleucous, about 15 mm. long; pod densely pilose; stipe about 1 cm. long; body linear, straight, about 2 cm. long, tapering at both ends. *A. collinus* Dougl. Mountain sides: B.C.—Ida.—Ore. *Son.* My-Jc.

40. *H. curvicaupus* (Sheld.) Heller. Stem 3-6 dm. high, cinereous-pilose, with crisp hairs, branched and often flexuose; leaflets 9-17, obovate or obovate-cuneate, truncate to emarginate at the apex, 8-15 mm. long, more or less pubescent on both sides, with crisp hairs; calyx densely pilose; tube 7-8 mm. long; teeth triangular, 1-1.5 mm. long; pod finely pubescent; stipe 10-12 mm. long; body curved, 3 cm. long, 4 mm. wide, tapering at both ends. *A. sperocarpus falciformis* A. Gray. Sandy or dry soil: Ida.—Nev.—Calif.—Wash. *Son.* My-Jl.

41. *H. Hallii* (A. Gray) Rydb. Stems adsurgent, 2-4 dm. high, strigose, leafy; leaflets 19-25, linear-oblong to elliptic-cuneate, truncate or retuse, 5-10 mm. long, strigose beneath, glabrous above; raceme dense; calyx strigose; tube 4-5 mm. long; teeth triangular-subulate, 1 mm. long; corolla purple, 12-15 mm. long; pod 2-2.5 cm. long, oblong-elliptic, tapering at both ends, short-stipitate, glabrous, 5 mm. thick. *A. Hallii* A. Gray. Mountains: Colo. *Submont.*—*Mont.* Jl-Au.

42. *H. Fendleri* (A. Gray) Rydb. Stems adsurgent, 3-5 dm. high, glabrous or nearly so; leaflets 13-25, oblong or linear-oblong, obtuse or retuse, 8-20 mm. long, sparingly strigose beneath, glabrous above; calyx strigose, with dark hairs; tube 3 mm. long, lanceolate or triangular, 1 mm. long; corolla 10-12 mm. long, purple; pod oblong-obovoid, about 2 cm. long, 7-8 mm. in diameter, strigillose or glabrate. *Phaca Fendleri* A. Gray. *A. Fendleri* A. Gray. River bottoms in the mountains: N.M.—Colo. *Submont.* My-Jc.

43. *H. flexuosus* (Dougl.) Rydb. Stems erect to decumbent, usually flexuose, strigose, 3-6 dm. long; leaflets 13-21, linear-oblong to elliptic-cuneate, obtuse or retuse, glabrous above, strigose beneath, 5-15 mm. long; racemes lax; calyx strigose; tube 3 mm. long; teeth subulate, 1 mm. long; corolla purple, or white tinged with purple; pod cylindric, 1.5-2 cm. long, 4 mm. thick, strigose, acute at both ends, straight or slightly curved. *Phaca elongata* Hook. *A. flexuosus* Dougl. Dry plains: Sask.—Minn.—Kans.—N.M.—Utah—Alta. *Plain*—*Mont.* My-Jl.

44. *H. proximus* Rydb. Stems erect, 2-3 dm. high, grayish strigose; leaflets 5-11, linear or linear-oblong, obtuse, 5-11 mm. long, grayish strigose; calyx about 2.5 mm. long, strigose; corolla 4-5 mm. long, white or ochroleucous; pod oblong-linear, terete, glabrous, about 12 mm. long and 3 mm. in diameter. Dry places: Colo. *Submont.* Jc.

45. *H. Salidae* Rydb. Stem 3 dm. or more long; leaflets 15-21, oblong-oblancoate to narrowly linear, 8-15 mm. long, strigose; racemes lax; calyx strigose and slightly black-hairy, about 3 mm. long; teeth short, triangular; corolla about 8 mm. long, purple-veined; pod narrowly linear-oblancoate, terete or nearly so, 2-2.5 cm. long, 2 mm. in diameter, finely strigose, very acute at the apex. Dry places: Colo. *Submont.* Au.

46. *H. macrocarpus* (A. Gray) Rydb. Stems 4-8 dm. high, strigose-canescens; leaves 5-10 cm. long, the upper often reduced to filiform phyllodes; leaflets 0-5, linear to filiform, strigose-canescens, 1-3 cm. long; raceme lax, 2-4 dm. long; calyx strigose-canescens; tube about 7 mm. long; teeth lanceolate, 1.5-2 mm. long; pod long-stipitate, glabrous; stipe about 1 cm. long; body lance-linear, tapering at both ends, 3-4 cm. long, 4-5 mm. thick. *A. lonchocarpus* A. Gray. (?) *A. duchesnensis* M. E. Jones. *A. macer* A. Nels. Sandy places: N.M.—Colo.—Utah. My-Jc.

35. KENTRÓPHYTA Nutt.

Perennial, diffusely branched herbs. Leaves pinnately 3-7-foliate; leaflets linear or subulate, inarticulate, rigid, spinulose-tipped; stipules more or less united. Flowers small, 2 or 3 together in the axils. Calyx campanulate, deeply 5-cleft; teeth equal, subulate. Corolla ochroleucous or purplish; banner oblong, reflexed; keel obtuse, shorter than the wings. Legume ovate, one-celled, flat, with both sutures prominent, 1- or 2-seeded.

Stipules united only at the base, more or less herbaceous.

Plant 3-4 dm. high, usually erect; stipules lanceolate, with long spinulose tips.

Plant low; stipules lance-subulate, not spinulose-tipped.

Stipules united for about half their length, scarious.

Leaflets linear-filiform, scarcely narrowed at the base; corolla ochroleucous, subsessile in the axils of the leaves

Leaflets lanceolate or oblanceolate, distinctly narrowed at the base.

Corolla ochroleucous, about 4 mm. long, the keel usually purple-tipped, leaflets less than 5 mm. long.

Flower-clusters subsessile or short-peduncled; calyx-lobes shorter than the tube.

Leaves short-hairy, stipules with long spreading tips; leaflets about 3 mm. long

Leaflets long-hairy; stipules not with spreading tips, leaflets 4-5 mm. long.

Flower-clusters on peduncles much exceeding the leaves; calyx-lobes equalling or exceeding the tube.

Corolla purple, about 6 mm. long; leaflets over 5 mm. long

1. *K. impensa* (Sheld.) Rydb. Stems erect or ascending, 3-4 dm. high, simple or with short branches; leaflets 5-7, subulate or linear-lanceolate, 8-15 mm. long, strigose, strongly ribbed and pungent; calyx-tube 1.5 mm. long; teeth 1 mm. long; corolla ochroleucous, 4 mm. long. *Astragalus Kentrophyta elatus* S. Wats. *A. viridis impensus* Sheld. Dry valleys: Nev.—w Colo.—Ariz. Son.—Submont. My-S.

2. *K. viridis* Nutt. Stems diffusely spreading and much branched, 1-3 dm. long; leaflets usually 5, subulate, pungent, 8-18 mm. long; calyx-tube 1.5-2 mm. long; teeth 1.5 mm. long; corolla ochroleucous, 5 mm. long. *A. Kentrophyta* A. Gray, in part. Plains, bad-lands, and hills: Wyo.—Colo. Plain—Submont. My-Je.

3. *K. montana* Nutt. Stems diffusely spreading, and intricately branched; stipules ovate, 1-3 mm. long; leaflets 5-7, subulate, pungent, 8-15 mm. long; calyx-tube 1.5-2 mm. long; teeth 1 mm. long; corolla ochroleucous, 4-5 mm. long. *A. Kentrophyta* A. Gray, in part. Bad lands, cañons, and sandy hills: Sask.—Neb.—Utah—Alta. Plain—Submont. Je—Au.

4. *K. minima* Rydb. Perennial forming cushions 1 dm. in diameter; stems 1-2 cm. high; stipules lanceolate, 1-3 mm. long; leaflets 5-9, linear-lanceolate, conduplicate, pungent, 3-4 mm. long; flowers usually solitary; calyx-tube 1-1.5 mm. long; teeth scarcely 1 mm. long; corolla about 3 mm. long. Mountains: Yellowstone Park, Wyo. Mont. Au.

5. *K. Wolfii* Rydb. Stems intricately branched, less than 1 dm. long; stipules triangular; leaflets 5, approximate, 3-4 mm. long, lanceolate, strongly conduplicate; calyx-tube scarcely 2 mm. long; teeth about 1 mm. long; corolla about 4 mm. long. High mountains: Colo. Mont.—Subalp. Jl.

6. *K. tegetaria* (S. Wats.) Rydb. Stems diffuse-procumbent, 5-15 cm. long, much branched; stipules lanceolate, acuminate, 3-5 mm. long; leaflets 7-11, narrowly linear-lanceolate, pungent, 4-6 mm. long; calyx-tube scarcely 1.5 mm. long; teeth fully 1.5 mm. long; corolla 4-5 mm. long. *A. tegetarius* S. Wats. Mountains: Nev.—(? Utah). Mont. Jl.

7. *K. aculeata* (A. Nels.) Rydb. Stems less than 1 dm. long, diffusely spreading or decumbent; stipules ovate, 4-5 mm. long; leaflets 5-9, narrowly linear-lanceolate, conduplicate, 4-8 mm. long; calyx-tube about 1.5 mm. long; teeth subulate, 1 mm. long; corolla 5-6 mm. long. *A. aculeatus* A. Nels. *A. tegetarius implexus* Canby. High mountains: Mont.—Colo.—Utah—Ida. Submont.—Mont. Jl—Au.

36. OROPHACA (T. & G.) Britton.

Cespitose, silvery or villous perennials, with branched woody caudices and deep roots. Leaves crowded, digitately 3-foliate (rarely 5-foliate), with scarious sheathing stipules. Flowers few, capitate or racemose. Calyx campanulate to cylindric. Corolla yellowish or purplish. Keel blunt. Pod coriaceous, 1-celled, without partition, ovoid or elliptic, few-seeded, villous or puberulent, partly included in the calyx.

Flowers sessile in the axils of the leaves, 12 mm or more long; corolla ochroleucous, calyx-tube longer than the teeth; plant pulvinate-cespitose

Corolla 2 cm or more long, glabrous; calyx-tube cylindrical, more than thrice as long as the teeth

Corolla 15-18 mm. long, pubescent on the outside; calyx-tube short-cylindric, about twice as long as the teeth

Flowers in small, peduncled 1-3-flowered racemes, purple or turning yellowish in age, less than 10 mm long; calyx-tube campanulate, not longer than the tube-teeth

Plant pulvinate-cespitose, flowers 8-10 mm long; inflorescence not exceeding the leaves.

Flowers about 10 mm long; pods puberulent.

Flowers about 8 mm long, pods hoary

Plant broadly cespitose, with prostrate branches; flowers about 6 mm. long, peduncles usually exceeding the leaves, pods hoary.

3 *O. tridactylica*.

4. *O. aretioides*.

5. *O. sericea*.

1. *O. caespitosa* (Nutt.) Britton. Stems 5 cm. or less, densely covered with leaves and scarious stipules; leaflets elliptic to narrowly oblanceolate, 0.5-2 cm long, appressed silvery-silky on both sides; calyx silky; tube cylindric, 10-15 mm. long; teeth 3-4 mm. long; corolla 2-3 cm. long; legume oblong-ovate, terete, silky-villous. *Phaca caespitosa* Nutt. *Astragalus triphyllus* Pursh. Dry gravelly hills: Sask.—Neb.—Wyo.—Mont. *Plain.* My-Je.

2. *O. argophylla* (Nutt.) Rydb. Stems less than 5 cm. high, densely covered with scarious, ovate stipules; leaflets elliptic or obovate to oblanceolate, 5-15 mm long, 3-5 mm. wide, appressed white-silky on both sides; calyx white silky-villous; tube cylindric, 6-8 mm. long; teeth subulate, 3 mm. long; corolla 15-18 mm. long; legume short and rounded-ovate, densely villous. *Phaca argophylla* Nutt. *Astragalus hyalinus* M. E. Jones. Dry hills and bad lands: w Neb.—Wyo.—Colo. *Plain.* Jl-Au.

3. *O. tridactylica* (A. Gray) Rydb. Stems less than 5 cm. high, densely covered with leaves and scarious, pubescent stipules; leaflets broadly or narrowly oblanceolate, 0.5-2 cm. long, 3-4 mm. wide, densely silky on both sides; calyx silky; tube 3 mm. long; teeth 4 mm. long, subulate; corolla about 1 cm. long; legume globose-ovoid, 6-8 mm. long. *A. tridactylus* A. Gray. Hills and plains: Colo. *Submont.* My-Je.

4. *O. aretioides* (M. E. Jones) Rydb. Stems more elongate than in the preceding; leaflets broadly oblanceolate, 0.5-1 cm. long, 3-4 mm. wide; calyx densely silky; tube about 2 mm. long; teeth subulate, 2 mm. long; corolla 7-8 mm. long; legume ovoid. *A. sericoleucus aretioides* M. E. Jones. Dry hills: Wyo.—Colo. *Submont.* My-Je.

5. *O. sericea* (Nutt.) Britton. Branches of the caudex often 1-2 dm. long; annual branches 2-4 cm. long, densely covered with leaves and ovate scarious pubescent stipules; leaflets oblanceolate to cuneate-obovate, 5-8 mm. long, 2-3 mm. wide, densely white-silky; calyx densely silky; tube 1.5 mm. long; teeth about 1.5 mm. long; corolla purple, 6-7 mm. long; legumes ovoid. *Phaca sericea* Nutt. *A. sericoleucus* A. Gray. Dry hills: Neb.—Wyo.—Colo. *Plain—Submont.*

37. ARAGALLUS Neeker. LOCO-WEED.

Perennial herbs, mostly acaulescent. Leaves alternate, odd-pinnate. Flowers racemose or spicate. Calyx campanulate, its teeth almost equal. Petals clawed; banner erect, ovate or oblong; wings oblong; keel produced at the apex into a porrect point. Stamens 10, diadelphous; anthers all alike. Pods sessile or stipitate, coriaceous, often more or less 2-celled by the intrusion of the upper suture. [*Oxytropis* DC.]

Stipules adnate to the petioles only slightly at the base; pods pendent, 1-celled, many times exceeding the calyx, plant often caulescent. I. DEFLEXI.

Stipules decidedly adnate to the petioles; pods not pendent, plant acaulescent

Leaves strictly pinnate, leaflets opposite

Fruiting calyx inflated, enclosing the fruit; plants densely caespitose, less than 1.5 dm. high. II. NANI.

Fruiting calyx not inflated, much exceeded by the pod

Inflorescence 1-3-flowered, plants dwarf, pulvinate.

Pods inflated, 1-celled, ovoid

Pods not inflated, oblong, almost 2-celled.

Inflorescence many-flowered, plants mostly over 1.5 dm. high, not pulvinate; III. INFLATI.

pod oblong, not inflated.

Leaflets verticillate.

IV. PARRYANI

V. CAMPESTRES.

VI. VERTICILLARES

I. DEFLEXI.

Plant more or less caulescent; racemes at least in fruit elongate; pods 1.5-1.8 cm. long

1. *A. deflexus*.

Plant subacaulescent, racemes short and head-like, pods about 1 cm. long

2. *A. foliolosus*.

II. NANI.

Peduncles scarcely exceeding the leaves, 1-3-flowered, bracts broadly ovate

Leaflets 5-10 mm. long, corolla 20-25 mm. long. 3. *A. multiceps*

Leaflets 3-6 mm. long, corolla about 15 mm. long. 4. *A. minor*.

Peduncles decidedly exceeding the leaves, many-flowered; bracts lanceolate or ovate-lanceolate.

Pubescence of the peduncles appressed or merely ascending; pods included in the calyx

Peduncles erect, strict, spike oblong, over 2 cm. long.

Corolla yellow or whitish, more than 2 cm. long.

Corolla purple, less than 2 cm. long.

Peduncles ascending, curved; spike subcapitate.

Pubescence of the peduncles loosely spreading, pods usually somewhat exserted.

5. *A. collinus*

6. *A. Blankinshipii*.

7. *A. nanus*

8. *A. Lagopus*.

III. INFLATI.

Leaflets 11-23.

Leaflets sparingly appressed-hirsute.

Leaflets densely canescent.

Leaflets 5-11, densely canescent.

9. *A. podocarpus*.

10. *A. Hallii*

11. *A. oreophilus*

IV. PARRYANI.

One species.

12. *A. Parryi*

V. CAMPESTRES.

Plant not viscid.

Corolla purple, rarely white.

Calyx with spreading hairs.

Calyx white-hairy; corolla usually light purple.

Plant loosely pubescent; peduncles with long spreading hairs.

8. *A. Lagopus*

Plant silky-canescant; peduncles with appressed hairs

Plant low, densely caespitose; peduncles ascending, curved, less than 5 cm. high; spike capitate

13. *A. argophyllus*.

Plant taller, over 1 dm. high, spike elongate

Calyx long-hairy, wings broad.

Calyx short-hairy, wings narrow.

Calyx black-hairy, corolla dark, bluish purple.

Plant white or grayish villous.

Plant silky, with appressed hairs, green.

14. *A. Besseyi*.

21. *A. albertinus*.

15. *A. atropurpureus*.

16. *A. melanodontus*.

Calyx with appressed hairs.

Legumes about 3 cm. long, short-stipitate and long-acuminato; corolla over 2 cm. long.

17. *A. Bigelovii*.

Legume 2 cm. long or less, sessile.

Legumes villous, almost 2-celled; caudices densely white-hairy; corolla 12 mm. long

18. *A. plattensis*

Legumes appressed-silky or short-hairy; caudices not conspicuously white-hairy.

Legume nearly 2-celled; leaves white-silky.

Corolla 12-15 mm. long; wings slightly emarginate.

19. *A. monticola*.

Corolla about 2 cm. long, wings broadly and deeply emarginate.

20. *A. sericeus*.

Legumes only half 2-celled

Leaves white-silky beneath; corolla 15 mm. long; pod ascending

21. *A. albertinus*.

Leaves green or only slightly silky.

Legumes spreading; leaves elliptic or oblong; corolla 15 mm.

long.

22. *A. dispar*.

Legumes erect or strongly ascending; leaflets lanceolate or linear-lanceolate, very acute.

Leaves spreading; pod 15 mm. long, abruptly contracted into a short spreading beak; corolla 15 mm. long.

23. *A. angustatus*.

Leaves erect, pod 20 mm. long, long-acuminato, nearly straight; corolla 18-20 mm. long.

24. *A. Lambertii*.

25. *A. alpicola* Rydb. Depressed acaulescent perennial; leaflets 9-13, oblong or elliptic, obtuse or acutish, 5-8 mm. long, white silky-strigose; scapes 2-6 cm. long, strigose; spike short, 3-8-flowered, subcapitate; calyx usually very dark from the intermixed black hairs, tube 5-6 mm. long; teeth subulate, 2 mm. long; corolla ochroleucous, about 15 mm. long; wings broad and broadly emarginate; pod about 15 mm. long, subcoriaceous, ovoid, short-beaked, nearly 2-celled. High mountains: Alta.—Mont.—B.C. *Mont.*—Alp. Je—Au.

26. *A. villosus* Rydb. Leaflets 25-31, rather crowded, 1-1.5 cm. long, lanceolate, very acute, densely but somewhat loosely silky; scape about 1.5 dm. long, loosely silky; spike dense, 4-5 cm. long; calyx white silky-villous; tube 6 mm. long; teeth very short, about 2 mm. long; corolla ochroleucous, without any purple, 12-15 mm. long; pod thin, almost perfectly 2-celled, white-silky, about 1.5 cm. long. *A. invenustus* Greene. Hills: Mont.—S.D. *Submont.*—Mont Je.

27. *A. gracilis* A. Nels. Leaves erect; leaflets 21-31, oblong-lanceolate, appressed-silky, 1-2.5 cm. long, acute; scapes 2-4 dm. high; spike elongate, 5-10 cm. long; calyx densely silky, sometimes somewhat blackish; tube 6-7 mm. long; teeth linear-subulate, 3-4 mm. long; corolla ochroleucous, about 15 mm. long, wings slightly emarginate; pod oblong-ovate, about 2 cm. long, semi-membranous, nearly 2-celled. *A. albertinus* Greene, in part. Open woodlands: Man.—S.D.—Ida.—Alta. *Submont.*—Mont. Je—Jl.

28. *A. spicatus* (Hook.) Rydb. Leaflets oval to oblong, 8-25 mm. long, 4-8 mm. wide, usually obtuse, silky-strigose; scape 1-1.5 dm. long; spike 4-10 cm. long; calyx silky-strigose, often with intermixed black hairs; tube 6-7 mm. long; teeth lanceolate, 3 mm. long; corolla 18-20 mm. long; pod short-hairy, often with some black hairs, oblong, about 2 cm. long. *O. campestris spicata* Hook. *A. cervinus* Greene. *A. Macouni* Greene. Plains and hills: Sask.—S.D.—Wyo.—Alta. *Plain*—Mont. My—Jl.

29. *A. albiflorus* A. Nels. Leaflets 13-21, oblong, elliptic, or lanceolate, 1.5-2.5 cm. long, grayish strigose; scape 1.5-3 dm. long; spike elongate, 5-10 cm. long; calyx silky, with intermixed black hairs; tube 7-8 mm. long; teeth lanceolate, 3 mm. long; corolla 2-2.5 cm. long; keel with a deep purple blotch; pod densely pubescent, oblong, about 2 cm. long, rather abruptly acuminate, about half 2-celled. *A. saximontanus* A. Nels. *A. majusculus* Greene. Plains. Mont.—Colo. *Submont.*—Mont. My—Jl.

30. *A. viscidus* (Nutt.) Greene. Leaflets 31-57, oblong-lanceolate, acute or rarely ovate and rounded at the apex; scape 5-15 cm. long, erect, hirsute-villous; spike 3-8 cm. long, calyx villous; tube about 5 mm. long; teeth subulate, 3 mm. long; corolla violet, rarely white, about 12 mm. long; pod oblong, ovoid, 12-15 mm. long, minutely pubescent; partition narrow. *O. viscida* Nutt. Mountains: Mont.—Wyo.—Nev. *Mont.* Jl—Au.

31. *A. viscidulus* Rydb. Leaflets 17-31, oblong, obtuse or acutish, 5-10 mm. long, sparingly villous; scape 0.5-2 dm. high, sparingly silky-villous; spike dense, 2-5 cm. long; calyx densely hairy, viscid and more or less blackish; tube about 5 mm. long; teeth lanceolate, 2.5 mm. long, glandular; corolla dark bluish purple, with yellowish base, about 12 mm. long; pod membranous, oblong-ovate, 1-1.5 cm. long, finely black-hairy, about half 2-celled. Hills and mountains Alta.—Wyo.—Utah—Yukon. *Mont.*

32. *A. Richardsonii* (Hook.) Greene. Leaflets numerous, verticillate, elliptic to lance-oblong, acute or obtuse, 8-20 mm. long, densely silky; scape 1-2 dm. high, villous; spike dense, 5-10 cm. long; bracts linear or lanceolate, often obtuse; calyx densely villous; tube 5 mm. long; teeth 2 mm. long; corolla dark blue, 10-12 mm. long; legume ovoid, densely villous, 12-15 mm. long, practically 2-celled. *O. splendens Richardsonii* Hook. Mountains: Sask.—Colo.—Yukon. *Submont.*—Mont. Je—Au.

33. *A. galioides* Greene. Leaflets rather sparingly silky, numerous, verticillate, linear-lanceolate, very acute, 5-15 mm. long; scape slender, 2-3 dm. high, villous; spike 5-10 cm. long, rather lax; bracts narrowly linear or subulate;

calyx villous; tube 5 mm. long; teeth subulate, about 2.5 mm. long; corolla dark blue, about 12 mm. long; pod ovoid, villous, about 1 cm. long, nearly 2-celled. Banks and hills: n Sask.—Alta.—Yukon. *Mont.*—*Boreal.* Je-Jl.

34. *A. splendens* (Dougl.) Greene. Leaflets very numerous, linear-lanceolate, 1-2.5 cm. long, very acute, white, silky-villous; scape 2-3 dm. high; spike dense or in age laxer, 4-10 cm. long; bracts narrowly linear to subulate, silky-villous, 1-2 cm. long; calyx densely white-villous; tube about 6 mm. long; teeth about 5 mm. wide; corolla 12-15 mm. long, dark blue; legume densely long-villous, 1 cm. long, ovoid, short-beaked, nearly 2-celled. *O. splendens* Dougl. *A. caudatus* Greene. Plains and hills. Man.—Minn.—Mont.—B.C. *Boreal*—*Mont.* Jl.

38. **GLYCYRRHIZA** (Tourn.) L. LIQUORICE.

Perennial herbs, with thick sweet roots and glandular-dotted foliage. Leaves odd-pinnate. Flowers perfect, in spikes or heads. Calyx with the two upper teeth somewhat shorter and partly united. Banner oblong or narrowly ovate, clawed; keel acute or obtuse. Stamens diadelphous, 9 and 1; anthers alternately smaller and larger. Pod sessile, indehiscent, covered with prickles or in exotic species with glands.

1. *G. lepidota* Nutt. Tall leafy perennial, 3-10 dm. high; leaflets 11-19, lanceolate or oblong, entire, 2-3.5 cm. long, mucronate-pointed, scaly when young; spikes many-flowered; corolla yellowish white, 12-13 mm. long; pod 12-15 mm. long, with hooked prickles. Copses and rich meadows: Ont.—N.Y.—Ariz.—Calif.—Wash.; Mex. *Son.*—*Plain*—*Submont.* My—Au.

39. **HEDYSARUM** (Tourn.) L. HEDYSARUM.

Perennial herbs, rarely shrubby, with odd-pinnate leaves, with several leaflets and no stipels. Flowers showy, in axillary, peduncled racemes, perfect. Calyx praeceolate, campanulate, nearly equally 5-toothed. Banner obovate or orbicular, clawed; wings oblong, shorter than the other petals; keel obliquely truncate, obtuse. Stamens diadelphous (9 and 1). Legume flat, divided transversely into rounded or subrhombic indehiscent internodes.

Calyx-teeth shorter than the tube, reticulations of the pods polygonal.

Corolla sulphur-yellow, fruit glabrous

Corolla purple, rose, or rarely white.

Fruit glabrous, except as to a few hairs on the margins, internodes 6-8 mm long.

Fruit distinctly appressed-pubescent, internodes 8-15 mm long

Corolla 12-15 mm long; bracts linear-subulate, 5 mm or more long

Leaflets oblong, elliptic, or oval, less than 3 cm. long.

Leaflets lanceolate, fully 3 cm long

Corolla 15-20 mm long; bracts lanceolate, 2-4 mm long

Calyx-teeth subulate, longer than the tube, reticulations of the pods transversely elongate, usually reaching from the middle to the margins, without cross-veins.

Flowers 15-20 mm. long

Calyx sparingly strigose; loment with 4-7 internodes; nodes more than half as wide as the internodes

Calyx canescent, loment with 2-5 internodes; nodes less than half as broad as the internodes

Flowers 10-15 mm. long.

Leaves glabrous above, at least in age

Leaflets elliptic-oblong, not fleshy, flowers 12-15 mm. long, purple; bracts lanceolate-subulate, 3-5 mm long, internodes of the loment 3-5.

Leaflets linear-oblong, somewhat fleshy; flowers about 10 mm long, rose-purple; bracts lanceolate, 1.5-2 mm long; internodes of the fruit 1-3.

Leaflets linear-oblong, somewhat fleshy; flowers about 10 mm long, rose-purple; bracts lanceolate, 1.5-2 mm long; internodes of the fruit 1-3.

Leaves canescent on both sides.

1. *H. sulphurescens* Rydb. Stem erect, 3-5 dm. high, glabrous or sparingly strigose; leaflets 11-15, oblong or elliptic or oval, 1-4 cm. long, glabrous or nearly so, shining; racemes lax; calyx-tube about 3 mm. long; teeth lanceolate, 1-2 mm. long; corolla about 15 mm. long; loment glabrous; internodes 2 or 3, 8-15 mm. long, 6-8 mm. wide, wing-margined; nodes 2.5-4 mm. wide. *H. flavescens* Coult. & Fish. Open woods and copses: Alta.—Wyo.—Ida.—B.C. *Submont.*—*Mont.* Je-Jl.

2. *H. americanum* (Michx.) Britton. Stem 2-7.5 dm. high, glabrous or nearly so; leaflets 11-21, oblong, 1.5-3 cm. long, rounded at both ends, glabrous above, sparingly hairy beneath; raceme lax; calyx-tube 2 mm. long; teeth triangular, 1-2 mm. long; corolla violet, rarely white, 12-18 mm. long; loment glabrous or nearly so; internodes 3-5, about 5 mm. wide. *H. alpinum americanum* Michx. *H. philoscia* A. Nels., a white-flowered form. Rocky places and open woods: Lab.—Vt.—S.D.—Wyo.—Alaska. *Boreal—Mont.* Je—Au.

3. *H. boreale* Nutt. Stem 3-7 dm. high, strigose especially above; leaflets oblong or lanceolate, rounded to acute at the apex, 1.5-3 cm. long, glabrous above, sparingly pubescent or glabrate beneath; racemes lax; calyx-tube 2 mm. long; teeth triangular, 1-1.5 mm. long; corolla violet or reddish purple to nearly white; loment finely strigose; internodes 2-4, 6-8 mm. long, 5-6 mm. wide. Banks and thickets: Sask.—S.D.—Wyo.—Mack. *Boreal—Mont.* Jl—Au.

4. *H. lancifolium* Rydb. Stem 5 dm. high or more, sparingly strigose; leaflets 13-21, lanceolate, acute, about 3 cm. long, 8 mm. wide, slightly strigose or glabrate; raceme lax; calyx strigose; tube about 3 mm. long; lower teeth 2.5 mm. long, the upper shorter; corolla about 15 mm. long, rose-purple; loment somewhat strigose; internodes 2-4, broadly oval, 12-15 mm. long, 8 mm. wide. Mountain woods: Mont—Alta. *Mont.* Jl.

5. *H. marginatum* Greene. Stem 6-10 dm. high, minutely strigose; leaflets 11-23, from oblong to oval or ovate, obtuse to emarginate, 1-3 cm. long, minutely appressed-pubescent on both sides or glabrate above; racemes rather short; calyx-tube 3 mm. long; upper teeth triangular, 1 mm. long, the lowest lanceolate, 2 mm. long; corolla rose-purple; loment strigose; internodes 2-5, 8-15 mm. long, 6-8 mm. wide. *H. untlahense* A. Nels. Draws and copses: Wyo.—Colo. *Mont.* Je—Jl.

6. *H. Mackenzii* Richards. Stem 2-4 dm. high, strigose above; leaflets 7-15, elliptic, 1-2.5 cm. long, finely grayish strigose beneath, glabrate above, raceme short; calyx-tube 3 mm. long; teeth 4-5 mm. long; corolla 18-20 mm. long, rose-purple; loment minutely strigose; internodes 5-7 mm. long, about 5 mm. wide. Meadows: N. W. Terr.—Alta.—Yukon. *Boreal—Subarct.* Je.

7. *H. utahense* Rydb. Stem 4-6 dm. high, finely strigose; leaflets 11-17, elliptic, oval, or oblong, usually rounded at both ends, 1-3 cm. long, glabrous above, finely cinereous-strigose beneath; calyx-tube nearly 3 mm. long; teeth 5 mm. long, attenuate; corolla rose-purple, 15-18 mm. long; loment minutely strigose; internodes 6-8 mm. long, 5-6 mm. wide. Hills among bushes: Utah—Ida. *Submont.—Mont.* My—Jl.

8. *H. pabulare* A. Nels. Stems 4-7 dm. high, finely strigose; leaflets 9-15, oblong or elliptic, 1-2 cm. long, glabrous above, cinereous-strigose beneath, calyx-tube about 2 mm. long; teeth 3-4 mm. long; loment minutely puberulent; internodes 5-7 mm. long, 5-6 mm. wide. Copses, cañons, and among sage-brush: Mont.—N.M.—Utah. *Submont.* My—Jl.

9. *H. carnosulum* Greene. Stems flexuose, 2-4 dm. high; leaflets 9-11, pale green, thick, linear-oblong to elliptic, 6-15 mm. long, glabrous above, cinereous-strigose beneath; raceme lax; calyx-tube 2 mm. long; teeth 2-3 mm. long, loment minutely strigose; internodes 7-8 mm. long, 5-6 mm. wide. Dry hills. Colo.—Utah—N.M. *Submont.* Je—Jl.

10. *H. cinerascens* Rydb. Stems 3-5 dm. high, strigose-canescens or glabrate below; leaflets 9-15, oblong or elliptic, 1-2 cm. long, silvery canescens-strigose on both sides; calyx-tube about 3 mm. long; teeth 5 mm. long; corolla reddish-purple, about 15 mm. long; loment strigose; internodes 3-4, 6-8 mm. long, about 6 mm. wide. *H. canescens* Nutt., not L. Dry hills: Sask.—N.D.—Wyo.—Utah—Ida.—Alta. *Submont.* Je—Jl.

40. ONOBRÛCHIS Scop. SAND-FOIN.

Herbs or undershrubs. Leaves odd-pinnate, without stipels. Flowers perfect, in spikes or racemes. Calyx-tube campanulate; teeth subulate, subequal, the lower smaller. Banner obcordate or obovate, sessile; wings shorter;

keel equalling the banner. Stamens partly diadelphous, *i. e.*, the tenth stamen united with the rest at the middle, but free at the base. Legume flat, 1-2-seeded, half-round, or spirally coiled, not jointed, pectinately prickly.

1. *O. Onobrychis* (L.) Rydb. Perennial herb; stem erect, 3-5 dm. high; leaflets 11-23, elliptic; calyx-lobes subulate, subequal; corolla rose-colored, striate; wings about half as long as the banner; legume brown, obliquely semi-orbicular, keeled above, the lower suture and apex with short broad prickly-points. *O. sativa* Lam. Cultivated and occasionally escaped: Mont.—Colo.—Utah—Ida.

41. *MEIBOMIA* Heister. TICK-TREFOIL, BEGGAR'S TICKS.

Herbs (all ours), shrubs or vines. Leaves alternate, pinnately 3-foliolate, rarely 1- or 5-foliolate; leaflets stipellate. Flowers perfect, in racemes or panicles. Calyx with bractlets at the base, campanulate; lobes unequal, the two upper ones more or less united. Corolla in ours reddish purple; banner more or less clawed; wings oblique, more or less coherent with the keel. Stamens monadelphous or partly diadelphous; anthers alike. Pod divided transversely into several indehiscent internodes, flat, in ours retrorsely hispid. [*Desmodium* Desv.]

Leaflets neither coriaceous nor strongly reticulate beneath
Leaflets coriaceous, strongly reticulate beneath.

1. *M. canadensis*.
2. *M. illinoensis*.

1. *M. canadensis* (L.) Kuntze. Stem erect, 5-20 dm. high, pubescent; leaflets elliptic or oblong-lanceolate, appressed-pubescent and paler beneath, hispidulous or glabrate above; flowers paniculate, 11-17 mm. long, purple; loment about 2.5 cm. long; internodes 3-5, somewhat triangular, straight or nearly so on the upper suture, uncinately pubescent. *Desmodium canadense* (L.) DC. Thickets and river banks: N.B.—N.C.—Okla.—(Black Hills) S.D.—Man. Plain—Submont. JI-S.

2. *M. illinoensis* (A. Gray) Kuntze. Stem 5-12 dm. high, uncinately pubescent; leaflets lanceolate or ovate-lanceolate, hispidulous above, cinereous beneath, 2.5-9 cm. long; flowers paniculate, 6-9 mm. long, purple; loment 1-2.5 cm. long; internodes 3-6, oval or orbicular, densely uncinately. *D. illinoense* A. Gray. Prairies: Ill—Kans.—S.D. Plain. Je-S.

42. *VÍCIA* L. VETCH, WILD PEA.

Perennial or annual herbaceous vines. Leaves alternate, abruptly pinnate, usually with tendrils or these represented by a tip. Flowers axillary, racemose or sessile. Calyx somewhat oblique and gibbous at the base, the upper two teeth shorter. Banner obovate or oblong, emarginate; wings obliquely oblong, adherent to the curved keel. Stamens diadelphous (9 and 1); tube oblique at the summit; anthers all alike. Style slender, with a tuft or ring of hairs at the summit. Pod flat, dehiscent, 2-valved, few- or several-seeded.

Racemes 3-40-flowered, flowers 1-2.5 cm. long.

Racemes one-sided, dense, 15-40-flowered.

Racemes lax, 3-10-flowered.

Leaflets linear to oblong; stipules usually narrow, semi-sagittate and often entire.

Leaves decidedly pubescent, rather thick and strongly veined.

Stem low; leaflets linear to oblong.

Stem tall; leaflets oblong or elliptic, only those of the lower leaves sometimes linear.

Leaves glabrous or slightly pubescent when young.

Leaflets elongate, narrowly linear; plant low and erect.

Leaflets, at least the upper ones, oblong or linear-oblong; plant tall and climbing.

Leaflets broad; stipules broadly semi-sagittate or semi-orbicular in outline, sharply toothed.

Leaflets usually oval, thin and not strongly veined, mostly entire and acute or rounded at the apex.

Leaflets obovate-cuneate, firmer and more strongly veined, truncate and toothed at the apex.

Racemes 1-2-flowered.

Flowers 1-1.8 cm. long, subsessile in the axils; annual.

Flowers 6-8 mm. long, on a distinct peduncle; perennial.

1. *V. cracca*.

2. *V. trifida*.

3. *V. oregana*.

4. *V. sparsifolia*.

5. *V. dissitifolia*.

6. *V. americana*.

7. *V. pumila*.

8. *V. angustifolia*.

9. *V. producta*.

1. *V. cracca* L. Stem weak, 3-12 dm. high; stipules narrowly semi-sagittate, entire; leaflets 18-24, thin, linear or linear-oblong, mucronate, 1.5-2 cm. long, finely pubescent; corolla bluish purple, 11-13 mm. long; pod 1.8-2.5 cm. long. Dry soil. Newf.—N.J.—Kans.—Ida.—B.C.; nat. from Eu. Je-Au.

2. *V. trifida* Dietr. Stem low, 1-4 dm. high, more or less pubescent when young; stipules broadly semi-sagittate, often toothed; leaflets 8-12, linear or narrowly oblong, acute at both ends or truncate at the apex, mucronate or cuspidate, dark green; racemes 3-6-flowered; corolla bluish purple, 15-18 mm. long; pod 2 cm. long, puberulent or glabrate. *V. tridentata* Schwein. *V. caespitosa* A. Nels., a depauperate form. *V. callianthemum* Greene. Wet meadows: w Ont.—Kans.—Tex.—Nev.—B.C. Plain—Mont. My-Au.

3. *V. oregana* Nutt. Stem 3-8 dm. high, somewhat pubescent when young, or glabrate, angled; stipules usually narrowly semi-sagittate, mostly toothed, leaflets 8-12, elliptic or those of the lower leaves linear, often truncate and somewhat toothed at the apex, 1-2.5 cm. long, dark green, appressed-pubescent, at least below; raceme 3-8-flowered; corolla pink-purple or bluish purple, 15-20 mm. long; pod about 3 cm. long. *V. vexillaris* Greene. Meadows: Sask.—N.M.—Calif.—B.C. Plain—Mont. My-Au.

4. *V. sparsifolia* Nutt. Stem low, 2-5 dm. high, glabrous; leaflets 8-12, narrowly linear, firm, strongly veined, acute at both ends, mucronate, glabrous or nearly so, 2-4 cm. long, 1-3 mm. wide; raceme 2-6-flowered; corolla bluish purple, about 18 mm. long; pod 3 cm. long, 6-7 mm. broad. *V. linearis* (Nutt.) Greene. Prairies and plains: Man.—Okla.—N.M.—Calif.—B.C. Plain—Mont. My-Au.

5. *V. dissitifolia* (Nutt.) Rydb. Stem tall, slender, 3-7 dm. high, glabrous; leaflets 8-12, linear or narrowly oblong, 1.5-5 cm. long, 2-5 mm. wide, rather thin, not strongly veined, acute at both ends, mucronate; raceme 3-6-flowered; corolla violet-purple, 15-18 mm. long. *Lathyrus dissitifolius* Nutt. Confused with and grading into *V. oregana*. Valleys: w Neb.—Colo.—Utah. Plain—Mont. Je-Au.

6. *V. americana* Muhl. Stem glabrous or nearly so, 3-10 dm. high; leaflets 8-12, oval or elliptic, or those of the lower leaves linear-oblong, thin, glabrous, usually rounded at both ends or retuse at the apex, mucronate, 1.5-3.5 cm. long, not strongly veined; racemes shorter than the leaves, 3-9-flowered; corolla bluish purple, 15-20 mm. long; pod glabrous, 2.5-3 cm. long. Meadows: N.B.—Va.—Ariz.—B.C. Plain—Mont. My-Au.

7. *V. pumila* Heller. Stem low, 2-4 dm. high, ascending, sparingly pubescent; leaflets 6-14, 10-15 mm. long, 4-6 mm. wide, truncate, cuspidate, and sometimes toothed at the apex, appressed-pubescent on both sides, prominently veined; racemes 3-6-flowered; corolla violet-purple, 15-18 mm. long. *V. californica* Rydb., not Greene. Valleys and river banks: Colo.—Calif.—B.C. Submont Je-Au.

8. *V. angustifolia* (L.) Reichard. Annual; stem glabrous, 3-5 dm. high; leaflets 5-11, those of the lower leaves oblong, truncate, those of the upper linear, mucronate, 1.5-3 cm. long; corolla purple or rose-colored; pod 4-5 cm. long, 5-7 mm. wide. Fields, meadows, and waste places. Ida.; also in the East; nat. from Eu.

9. *V. producta* Rydb. Stems slender, decumbent or ascending, 2-3 dm. high; stipules narrow, semi-lanceolate, entire; leaflets 7-11, oblong to linear, 5-15 mm. long, obtuse, mucronate; peduncles 2-4 cm. long, produced beyond the upper flowers; corolla yellowish white, tipped and tinged with purple. *V. Thurberi* S. Wats., in part. Among bushes: Colo.—N.M.—Ariz.—Utah. Submont. My-Je.

43. LATHYRUS (Tourn.) L. VETCHLING.

Herbaceous vines, rarely erect herbs, mostly perennials, with horizontal rootstocks. Leaves alternate, abruptly pinnate, the rachis usually tendrill-bearing at the apex, or the tendril represented by a tip or an appendage. Flowers

racemose (raceme sometimes 1-flowered), perfect. Calyx obliquely campanulate, gibbous at the base, its teeth nearly equal, or the upper shorter. Banner obovate, emarginate, clawed; wings obliquely oblong, adherent to the shorter curved keel. Stamens diadelphous (9 and 1), monadelphous below; tube usually truncate at the apex. Style curved, flattened, hairy along its inner side. Legumes linear, more or less flattened, dehiscent, 2-valved. Seeds usually several.

Corolla purple

- Stem winged, leaflets linear, lanceolate, or oblong; flowers about 15 mm. long
 - 1. *L. palustris*.
- Stem wingless.
 - Racemes 1-flowered.
 - 11. *L. Torreyi*.
 - Racemes several- to many-flowered.
 - Tendrils much reduced, stem mostly erect
 - Leaflets 1 or 2 pairs, flowers 8-10 mm. long.
 - Leaflets narrowly linear. 2 *L. Sandbergi*.
 - Leaflets oval or oblong. 3. *L. bijugatus*.
 - Leaflets 3 or 6 pairs, flowers 20-25 mm. long. 4. *L. ornatus*.
 - Plant glabrous or nearly so. 5. *L. incanus*.
 - Plant decidedly villous-pubescent.
 - Tendrils usually well developed, plant more or less climbing. 6. *L. coreaceus*.
 - Corolla less than 18 mm. long
 - Leaflets linear to oblong-elliptic, thick, veiny. 7. *L. graminifolius*.
 - Leaflets linear
 - Leaflets broadly oval or ovate
 - Tendrils usually 3-cleft, leaflets moderately firm, strongly veined.
 - Stipules large, often half as long as the small, 1-3 cm. long leaflets. 8. *L. Schaffneri*.
 - Stipules very small in comparison with the large 2-7 cm. long leaflets. 9. *L. venosus*.
 - Tendrils simple, leaflets not strongly veined. 10. *L. Nuttallii*.
 - Corolla 2 cm. long or more
 - Stipules large and broad, about half as long as the leaflets
 - Leaflets not linear.
 - Leaflets rounded-oval, obtuse or rounded and mucronate at the apex. 12. *L. utahensis*.
 - Leaflets elliptic, acute at both ends, cuspidate at the apex. 13. *L. pauciflorus*.
 - Leaflets narrowly linear. 14. *L. tenuior*.
 - Stipules narrow, less than half as long as the leaflets.
 - Leaflets elliptic to oval. 15. *L. decaphyllus*.
 - Leaflets linear-oblong or oblanceolate. 16. *L. brachycalyx*.
- Corolla white or yellowish
 - Tendrils well developed
 - Stipules large and broad, often half as long as the leaflets, corolla about 15 mm. long. 17. *L. ochroleucus*.
 - Stipules smaller, much less than half as long as the leaflets; corolla about 20 mm. long. 18. *L. laetivirens*.
 - Tendrils reduced, stipules narrow and small.
 - Corolla about 15-20 mm. long
 - Leaflets ovate or oval or obovate. 19. *L. obovatus*.
 - Leaflets linear or lance-linear. 4. *L. ornatus*.
 - Corolla 10-15 mm. long.
 - Leaflets oval. 20. *L. leucanthus*.
 - Leaflets linear. 21. *L. arizonicus*.

1. ***L. palustris* L.** Stem glabrous or nearly so, 3-6 dm. high; leaflets 2-4 pairs, 2.5-6 cm. long; tendrils usually branched; inflorescence 7-15 cm. long, 2-6-flowered; corolla purple, 12-15 mm. long; pod linear, 4-5 cm. long. Wet places: Lab.—N.Y.—S.D.—Ore.—Alaska; Eurasia. *Plain*—*Submont.* My.—Au.

2. ***L. Sandbergi* (White) Howell.** Stem 2-3 dm. high, angled, glabrous, erect, leaflets 5-10 cm. long, 2-4 mm. wide, glabrous; inflorescence 2-5 mm. long, 1-3-flowered; corolla purplish, about 1 cm. long, *L. bijugatus Sandbergi* White. Hillsides and copses: Ida.—Wash. *Submont.* My.—Je.

3. ***L. bijugatus* White.** Stem erect or decumbent at the base, 2-3 dm. high, glabrous; leaflets thin, 2-5 cm. long, 6-12 mm. wide, mucronate; inflorescence 2-5 cm. long, 1-2-flowered; corolla purplish, 8-10 mm. long; pod 6-seeded. Hillsides and rocky ground: Mont.—Ida.—Wash. *Submont.* Je.

4. ***L. ornatus* Nutt.** Stem erect, glabrous or nearly so, 2-4 dm. high; leaflets linear or lance-linear, 1.5-4 cm. long, 3-5 mm. wide, glabrous; peduncles

9. *G. viscosissimum* F. & M. Stem 2.5-6 dm. high; leaf-blades pentagonal in outline, 4-11 cm. wide, hirsute, 3-5-parted, the divisions sharply and irregularly incised; sepals 12-15 mm. long, oblong-lanceolate, finely hirsute, awn-tipped; petals pink-purple, 17-20 mm. long; carpels glandular-pilose. Woods and among bushes: S.D.—Colo.—Calif.—B.C. *Mont.*—*Submont.* My-S.

10. *G. strigosum* Rydb. Stem 4-8 dm. high; leaf-blades reniform in outline, 5-12 cm. in diameter, finely strigose on both sides, deeply 3-7-cleft; divisions rhombic in outline, 3-cleft and toothed; sepals densely glandular, oval, about 8 mm. long; bristle-tipped; petals broadly obovate, rose or light violet, carpels glandular-hirsute. Woods: Sask.—Colo.—Nev.—Wash. *Mont.*—*Submont.* My-Au.

11. *G. incisum* Nutt. Stem 3-9 dm. high; leaf-blades pentagonal in outline, 6-15 cm. broad, 5-parted, the divisions cleft and coarsely toothed; pedicels glandular-hirsute; sepals awn-tipped, 11-12 mm. long, lanceolate, short-hirsute, petals purple, 15-23 mm. long, carpels 5 mm. long, sparingly pubescent. *G. oreganum* Howell. Mountain valleys: B.C.—Mont.—n Calif. *Submont.* My-Au.

12. *G. canum* Rydb. Stem 3-7 dm. high; leaf-blades suborbicular in outline, 6-12 cm. wide, densely hoary, 3-5-parted, the divisions sharply incised, pedicels glandular-hirsute; sepals awn-tipped, 13-15 mm. long, lanceolate, glandular-ciliate; petals purple, 13-18 mm. long; carpels 5 mm. long, minutely pubescent. *G. incisum* Howell, not Nutt. Valleys: Wash.—Ore.—Wyo.—Alta *Submont.* Je-Jl.

13. *G. Parryi* (Engelm.) Heller. Stems tufted, 2-6 dm. long; leaf-blades thickish, pentagonal, 2.5-6 cm. broad, canescent-strigillose, more or less glandular, 3-5-parted, the divisions incised or lobed; pedicels glandular-hirsute; sepals awn-tipped, 8.5-9.5 mm. long, elliptic to ovate, glandular-ciliate; petals pink-purple, 12-15 mm. long; style-column 18-23 mm. long; carpels glandular-hirsute. *G. Fremontii* Parryi Engelm. Mountains: Wyo.—Colo.—Ariz. *Mont.*—*Submont.* Je-Au.

14. *G. Pattersonii* Rydb. Stems ascending or diffuse, 2-4 dm. long; leaf-blades reniform in outline, about 3 cm. broad, glandular-villous on both sides, deeply 5-7-cleft; lobes broadly obovate-cuneate, 3-toothed; pedicels and calyx glandular long-villous; sepals long, oval, with a short bristle-tip; petals obovate, about 1 cm. long, light purple or rose, with darker veins; style-column about 2 cm. long; carpels pubescent. Mountains: Colo. *Mont.*—*Subalp.* Je-S.

15. *G. Fremontii* T. & G. Stems tufted, 2-5 dm. long, ascending or spreading, retrorsely pubescent, somewhat glandular above; leaf-blades thick, pentagonal, 2-4.5 cm. wide, 3-5-parted, canescent, the divisions coarsely toothed or lobed; sepals awn-tipped, 10-11 mm. long, oblong or oblong-lanceolate, ciliate and glandular; petals pink-purple, 12-15 mm. long; style-column 2-2.5 mm. long; carpels pilose. Mountains: Colo.—N.M.—Ariz.—Utah. *Submont.* Jl-S.

16. *G. caespitosum* James. Stems 1.5-4 dm. long, retrorsely pubescent; leaf-blades thick, pentagonal or suborbicular, 2-6 cm. wide, canescent or strigillose, 3-5-parted, the divisions incised or lobed; sepals awn-tipped, 9-11 mm. long, oblong-elliptic, ciliate; petals rose-purple, 14-17 mm. long; style-column 18-20 mm. long. Plains, foot-hills, and the lower mountains: Colo.—Wyo.—Utah. *Plain*—*Mont.* My-Jl.

17. *G. Cowenii* Rydb. Stems few, erect, 3-5 dm. high, retrorsely pubescent; leaf-blades pentagonal in outline, 2.5-6 cm. wide, 3-5-parted, the divisions cleft or toothed, canescent; pedicels more or less hirsute; sepals awn-tipped, 10-12 mm. long, elliptic, ciliate; petals pink-purple, 12-18 mm. long; style-column 15-18 mm. long, pubescent and sparingly glandular. Mountains: Colo.—Wyo. *Submont.* Je-Jl.

18. *G. marginale* Rydb. Stems erect or ascending, 1-4 dm. high, minutely retrorsely strigose; leaf-blades pentagonal in outline, 2-3 cm. wide, minutely pubescent, 3-5-parted, the divisions, at least the terminal one, cuneate, and mostly

3-toothed at the apex; pedicels retrorsely pubescent; sepals awn-tipped, 8-9.5 mm. long, elliptic-lanceolate, minutely pubescent; petals light pink or rose-colored, 12-15 mm. long; style-column 15-18 mm. long, minutely hirsute; carpels sparingly pubescent. Mountain plateaus: Utah. *Mont. Au.*

19. *G. atropurpureum* Heller. Stems tufted, spreading, 1-9 dm. long, retrorsely pubescent; leaf-blades thick, 3-5-parted, strigillose-pubescent, 2-5 cm. wide, the lower reniform, the upper pentagonal in outline; divisions incised or coarsely toothed; pedicels retrorsely pubescent, not glandular; sepals awn-tipped, 10-11.5 mm. long, oblong, finely pubescent and ciliate; petals purple, 12-15 mm. long, oblong or narrowly obovate, not notched; style-column 19-23 mm. long, minutely pubescent; carpels pilose. *G. gracile* Engelm., not Ledeb. Plains and hills: Colo.—Utah—N.M.—n Mex. *Submont.* Je-S.

2. *ERÓDIUM* L'Her. STORKBILL, ALFILARIA, PIN CLOVER, FILAREE.

Annual or perennial herbs, with opposite leaves. Leaf-blades pinnately divided or lobed, or if merely toothed, pinnately veined, long-petioled. Sepals 5, usually awn-tipped. Petals 5, those of the later flowers often reduced. Stamens 5, alternating with 5 staminodia. Style-column very elongate, the styles pubescent within, and spirally coiled, when freed from the central axis. Carpels narrow, spindle-shaped. Seeds smooth.

1. *E. cicutarium* (L.) L'Her. An annual, with low spreading stem; leaf-blades pinnately divided; segments oblong to ovate, pinnatifid or incised; peduncles and pedicels more or less hirsute, rarely glandular, sepals oblong, 6-7 mm. long, the short tips with 1 or 2 bristle-like appendages; petals slightly longer than the sepals, pink, with darker veins; anther-bearing filaments toothless; style-column 3-4 cm. long. Waste places and fields: N.S.—N.J.—N.M.—Calif.—B C.—Alta.; Mex. and C. Am.; nat. from Eu. *Plain—Submont.* My—Au.

FAMILY 67. OXALIDACEAE. WOOD-SORREL FAMILY.

Mostly herbs, with elongate or bulb-like rootstocks. Leaves alternate, sometimes all basal, compound, in ours palmately trifoliate. Flowers perfect, regular or nearly so, cymose. Sepals and petals 5. Stamens 10, in 2 series, monadelphous. Gynoecium of 5 united carpels; styles distinct or coherent. Fruit a valvate capsule.

Acaulescent herbs, with bulb-like rootstocks; petals violet or purple. 1. *IONOXALIS*.
Caulescent plants, with slender horizontal rootstocks or with an annual taproot; petals yellow. 2. *XANTHOXALIS*.

1. *IONÓXALIS* Small. VIOLET WOOD-SORREL.

Perennial succulent herbs, with scaly bulbs, scapose. Leaves basal, with elongate petioles; blades palmately 3-9-foliate. Flowers in umbel-like cymes, subtended by several bracts. Sepals 5, each with one or two pairs of apical tubercles. Petals 5, violet, blue, red, or white. Stamens 10; filaments united at the base, the longer sometimes appendaged on the back. Capsules erect.

1. *I. violacea* (L.) Smell. Plant 1-4 dm. high; bulb-scales 3-ribbed; petioles glabrous; leaflets 3, obreniform, 1-2.5 cm. broad, glabrous, bright green above, slightly paler beneath; scape and pedicels glabrous, the former 4-19-flowered; sepals oblong to ovate-oblong, 4-6 mm. long, glabrous; petals violet, 14-20 mm. long; filaments pubescent; capsule globose-ovoid, 4-5 mm. long. *Oxalis violacea* L. Rich soil: Me.—Fla.—Tex.—Colo. *Plain—Submont.* Ap-S.

2. *XANTHÓXALIS* Small. YELLOW WOOD-SORREL.

Herbs, perennial, with horizontal rootstocks or annual taproots, or rarely shrubs. Stem leafy. Leaves alternate, sometimes clustered at the nodes. Leaves palmately 3-foliate; leaflets mostly obcordate (in our species), or rarely broadest at the base, sessile. Flowers in umbel-like or dichotomous cymes. Sepals 5, herbaceous or petaloid. Petals 5, yellow or purplish, deciduous.

Stamens 10; filaments united into a tube at the base. Ovary elongate; styles filiform or subulate. Capsule columnar or oblong, prismatic, erect.

Stem appressed-pubescent; capsule pubescent

1. *X. stricta*

Stem loosely pubescent, or nearly glabrous; capsule glabrous.

2. *X. Bushii*.

1. *X. stricta* (L.) Small. Stems erect or decumbent in age, 0.5–5 dm. long, strigillose; leaflets 15–20 mm. wide; peduncles longer than the petioles; sepals 4–5 mm. long; petals pale yellow, 5–10 mm. long; capsule columnar, 16–30 mm. long, rather abruptly pointed. *Oxalis stricta* L. Woods, roadsides, and cultivated grounds: N.S.—Fla.—N.M.—Wyo.; Mex. *Plain—Submont.* Ap-N.

2. *X. Bushii* Small. Stem slender, erect, 1–2 dm. high, villous; leaflets broadly obcordate, glabrous, 8–20 mm. long; peduncles very slender, about 5 cm. long; inflorescence cymose, but often reduced to 2–3 flowers and umbel-like; sepals 4–5 mm. long, oblong; petals 6–7 mm. long; capsule columnar, 12–15 mm. long. *Oxalis Bushii* Small. *Oxalis* and *Xanthoxalis coloradensis* Rydb. River bottoms: N.S.—Ga.—Colo.—S.D. *Plain—Mont.* My-Au.

FAMILY 68. LINACEAE. FLAX FAMILY.

Herbs with alternate leaves, with or without stipules. Flowers perfect, regular, racemose or paniculate. Sepals and petals 5, rarely 4 or 6. Stamens as many as the sepals, monadelphous. Gynoecium of 5, sometimes 2 or 3, united carpels. Fruit a capsule, opening by twice as many valves as there are carpels.

Stigmas introrse and more or less elongate; sepals glandless, flowers in ours blue, rarely white

1. LINUM

Stigmas terminal and capitate; sepals, at least the inner ones, with marginal glands. flowers in ours yellow.

2. CATHARTOLINUM

1. LINUM L. FLAX, BLUE FLAX.

Annual or perennial glabrous plants, sometimes woody at the base. Leaves alternate, without stipules or stipular glands, narrow, entire. Sepals 5, persistent. Petals 5, in ours blue, or rarely white, unappendaged and entire at the base. Stamens 5; filaments dilated and united at the base, each sinus with a short staminodium. Gynoecium 5-carpellary, not cartilaginous at the base; styles 5, elongate, distinct or united; stigmas elongate, introrse. Capsules 5-celled, the carpels with incomplete false partitions. Seeds flat, elongate-lenticular.

Inner sepals ciliate; stigmas much elongate; introduced annual

1. *L. usitatissimum*.

Sepals not ciliate, stigmas rather short; native perennials.

Sepals over 5 mm. long at maturity, more than one-half as long as the capsule.

2. *L. Lewisii*.

Sepals less than 5 mm. long, less than one-half as long as the capsule

3. *L. pratense*.

1. *L. usitatissimum* L. Stem 2–8 dm. high, glabrous; leaves narrowly linear-lanceolate, 3-nerved, sessile; sepals acuminate, the outer elliptic or elliptic-lanceolate, the inner elliptic-ovate or ovate, ciliate, 7–9 mm. long, all 3-nerved at the base; petals blue 1–1.5 cm. long; capsule 6–8 mm. long. Waste places and old fields; occasionally escaped from cultivation, native of Eu. My-S.

2. *L. Lewisii* Pursh. Stem 2–7 dm. high, often branched at the base, obscurely striate; leaves erect, linear or nearly so, 1–2 cm. long; sepals 5.5–7 mm. long, the outer ovate, short-acuminate, the inner broader, mucronate; petals blue or rarely white, 1.5–2 cm. long. Plains and hills: Man.—Neb.—Tex.—Calif.—Alaska; n Mex. *Plain—Mont.* My-Au.

3. *L. pratense* (Norton) Small. Stem 1–6 dm. high, striate in age, commonly branched at the base; leaves commonly numerous and crowded towards the base, narrowly linear or subulate, 0.5–1 cm. long, rather succulent; bracts subulate; sepals mostly 4–5 mm. long, ovate to oblong-ovate, the outer acute or short-acuminate, the inner broader, mucronulate; petals blue, 1–1.5 cm. long. Dry plains: Sask.—Tex.—Ariz.—Nev.—Wyo. *Plain—Submont.* My-S.

2. CATHARTOLINUM Reichenb. YELLOW FLAX.

Annual or perennial herbs. Leaves alternate or occasionally opposite, without stipules, but often with stipular glands, mostly narrow, entire or serrulate. Sepals 5, persistent or deciduous, at least the inner ones with gland-tipped teeth. Petals 5, yellow or white. Stamens 5; filaments united at the base, monadelphous, the free portion more or less dilated at the base, sometimes with short staminodia in the sinuses. Gynoecium 5-carpellary, rarely 2-carpellary. Styles filiform, distinct or united; stigmas terminal, capitate. Capsule ovoid or depressed, 5-celled, rarely 2-celled, or completely or incompletely 10-celled by false septa. Seeds flattened, often lunate.

Styles distinct; capsules without cartilaginous thickenings at the bases of the sepals; sepals ovate, scarcely as long as the capsule; leaves oblong or oblong-linear, flowers in fastigate cymes

Outer sepals obtuse or merely acutish at maturity; capsule 3 mm. long

1. *C. sedoides*.

Outer sepals acuminate at maturity; capsule 4 mm. long

2. *C. Kingii*.

Styles more or less united, capsule with cartilaginous thickenings at the base of the sepals; sepals lanceolate, much exceeding the capsule, leaves linear-lanceolate to subulate.

Outer sepals copiously gland-toothed, staminodia none or entire

3. *C. puberulum*.

Stem, branches, and pedicels densely puberulent

Stem, branches, and pedicels not densely puberulent, usually glabrous

Sepals not more than half longer than the capsule, the inner ones with relatively coarse and conspicuously gland-tipped teeth.

Petals 5-9 mm. long

Outer sepals with lateral ribs faint near the base, branches blunt-angled.

4. *C. australe*.

Outer sepals with lateral ribs prominent throughout, branches wing-angled

5. *C. compactum*.

Petals 10-20 mm. long

False septa of the capsule slightly thickened; sepals becoming 6-8 mm. long, petals 11-15 mm. long

6. *C. rigidum*.

False septa thickened half their width, sepals becoming 9-11 mm. long; petals 17-20 mm. long.

7. *C. Berlandieri*.

Sepals twice as long as the capsule, long-acuminate, aristate, the inner ones with very numerous, fine, inconspicuously gland-tipped teeth.

8. *C. aristatum*.

Outer sepals entire or with few scattered teeth, staminodia 2-lobed.

9. *C. subteres*.

1. *C. sedoides* (Porter) Small. Perennial, with a woody base; stems or branches mostly less than 1 dm. long; leaves very numerous, approximate, near the base of the stem, more or less imbricate, erect or ascending, clavate, the upper short-linear, 3-9 mm. long; outer sepals ovate, about 4 mm. long, with few gland-tipped teeth; petals bright yellow; capsule ovoid, 3 mm. long. *L. Kingii sedoides* Porter. *L. Kingii pinetorum* M. E. Jones. High mountains: Utah. Subalp. Jl.

2. *C. Kingii* (S. Wats.) Small. Perennial, with a woody base; stem and branches more or less tufted, 0.5-3 dm. high; leaves numerous, spreading, thick, the lower linear-spatulate, the upper linear, 1-2 cm. long; outer sepals ovate, about 4 mm. long, sparingly gland-toothed, the inner ones broader, abruptly short-pointed; petals bright yellow; capsule ovoid, 4 mm. long. *Linum Kingii* S. Wats. High mountains: Utah—Wyo. Submont.—Mont. Jl—Au.

3. *C. puberulum* (Engelm.) Small. Pale green, often glaucous, perennial; stem 0.5-3 dm. high, usually branched throughout; leaves numerous and crowded at the base, erect or ascending, thick, the lower linear or linear-spatulate, entire, the upper linear or subulate, often gland-toothed below the middle; sepals narrowly lanceolate, becoming 7-9 mm. long, acuminate, the inner ones shorter than the outer, and more coarsely toothed towards the apex; petals light yellow, 12-17 mm. long. *L. rigidum puberulum* Engelm. Dry plains and hills: Colo.—Tex.—Ariz.—Nev. Plain—Submont. Ap—Au.

4. *C. australe* (Heller) Small. Pale green perennial, glabrous or nearly so; stem 1.5-5 dm. high, simple below, the branches erect or ascending; leaves scattered, early deciduous, thick, serrulate; sepals lanceolate or oblong-lanceolate, becoming 6-8 mm. long, evenly glandular-toothed, long-acuminate; inner slightly broader than the outer; petals pale yellow, 6-9 mm. long. *L. australe* Heller.

Dry plains and hills: Colo.—N.M.—Ariz.—Utah; n Mex. *Son.*—*Submont.* Ap—Au.

5. *C. compactum* (A. Nels.) Small. Dull-green perennial; stem 1-2 dm. high, branched at the base; leaves numerous towards the base, but early deciduous, the upper more persistent, erect or ascending, entire; sepals lanceolate, becoming 6-8 mm. long, acuminate, evenly glandular-toothed, the inner much shorter than the outer; petals yellow, 7-9 mm. long; capsule ovoid, 4 mm. long. *L. compactum* A. Nels. Dry plains: N.D.—Mo.—Wyo.—Mont. *Plain*—*Submont.* Je—Au.

6. *C. rigidum* (Pursh) Small. Glabrous, bright green perennial; stem 1-5 dm. high, simple at the base, corymbosely branched above, prominently striate-angled; leaves relatively few, erect, early deciduous, linear to linear-lanceolate, 0.6-3 cm. long, acute or acuminate, the upper ones glandular-ciliate or glandular-serrulate; sepals lanceolate, becoming 6-8 mm. long, acuminate, evenly glandular-toothed, the inner ones shorter and broader than the outer ones; petals yellow; capsule ovoid, 4-5 mm. long. *L. rigidum* Pursh. Plains and hills: Man.—Tex.—Colo.—Alta. *Plain*—*Submont.* Je—O.

7. *C. Berlandieri* (Hook.) Small. Bright green glaucescent perennial; stem 0.5-3.5 dm. high, simple at the base, branched and angled above; leaves rather few, spreading or ascending, linear to linear-lanceolate, mostly 1.5-4 cm. long, acuminate, entire, the lateral veins marginal; sepals lanceolate, becoming 9-11 mm. long, evenly glandular-toothed, acuminate and minutely spinulose-tipped, the inner ones shorter; petals light yellow, 17-20 mm. long; capsule ovoid, 4-4.5 mm. long. *L. Berlandieri* Hook. *L. arkanianum* Osterhout. Sandy soil: Neb.—Tex.—Colo. *Plain*—*Son.* Ap—Jl.

8. *C. aristatum* (Engelm.) Small. Glaucescent perennial; stem 2-4 dm. high, corymbosely branched above, striate or somewhat angled, glabrous; cymes few-flowered; leaves few, erect, thickish, the lower linear or narrowly linear-spatulate, about 1 cm. long, the upper subulate, slender, with involute margins, entire; sepals linear-lanceolate, becoming 9-10 mm. long, aristately tipped, the inner shorter than the outer, more finely toothed, petals yellow, 13-15 mm. long; capsule about 3 mm. long, ovoid. *L. aristatum* Engelm. Sandy soil: w Tex.—se Utah—n Mex. *Son.* Jl—Au.

9. *C. subteres* (Trelease) Small. Glaucous perennial; stem 2-3 dm. high, branched at the base, terete or nearly so; leaves crowded at the base and on the main branches, erect, thick, succulent, the lower linear-spatulate, the upper linear or subulate, 1-1.5 cm. long; sepals lanceolate, becoming 6-7 mm. long, abruptly pointed, the inner shorter, with several teeth; petals yellow, 10-13 mm. long; capsule ovoid, 4 mm. long. *L. aristatum subteres* Trelcase. Sandy places: Nev.—Utah. *Son.*—*Submont.* My—Au.

FAMILY 69. BALSAMINACEAE. JEWEL-WEED FAMILY.

Herbs, with more or less succulent leaves and swollen nodes. Flowers perfect, irregular, zygomorphic. Sepals 3, rarely 5, the posterior one petaloid, strongly saccate or spurred at the base. Petals 5, or by union of two and two only 3. Stamens 5, alternate with the petals; anthers more or less united around the stigma. Gynoecium of 5 united carpels; styles obsolete. Pod a 5-celled capsule, elastically dehiscent.

1. IMPATIENS L. TOUCH-ME-NOT, JEWEL-WEED.

All our species annual. Sepals in ours 3. Lateral petals each united with the adjacent posterior one. Capsule elastically dehiscent. Seeds usually many, pendulous above each other in a single row.

Spur present.

Spur porrect, 4 s., bent at a right angle to the sack, one-fourth as long as the same or less; sack as broad as long, pale yellow, unspotted or minutely so.

1. *I. pallida*.

inate flowers uppermost. Sepals 4-6, usually 5. Petals usually present, but often small, alternating with the glands. Stamens 5 or more, inflexed in bud. Pistillate flowers below the staminate ones. Sepals 5-10. Petals usually wanting. Ovary 3-celled; ovules solitary in each cell; stigmas once, twice, or thrice 2-cleft. Capsule mostly splitting into three 2-valved carpels. Seeds smooth or minutely pitted.

Annual, leaf-blades linear, lanceolate, or oblong, 3-5 times as long as the petioles

Perennial; leaf-blades elliptic or oval, only a little longer than the petioles

1 *C. texensis*.

2 *C. longipes*

1. *C. texensis* (Klotzsch) Muell. Arg. Lepidote, dioecious annual; stem 4-16 dm. high, di- or tri-otomously branched; the staminate plant usually more slender than the pistillate one and with narrower leaves; leaf-blades linear, lanceolate, or oblong, 4-12 cm. long, entire; staminate racemes 1-3 cm. long, sepals oblong to ovate-oblong; stamens 8-12; pistillate flowers 2-4 together or solitary; sepals triangular; capsule globose or oval, 4-6 mm. long, warty. Plains and prairies: Ill.—Ala.—Tex.—Ariz.—Wyo.; Mex. *Plain*. My—Au.

2. *C. longipes* M. E. Jones. Perennial, woody at the base, 3-6 dm. high, white, lepidote-stellate; leaf-blades 2-3 cm. long, densely stellate beneath, sparingly so or glabrate above; staminate flowers 2 mm. wide; pistillate ones 6 mm. wide; sepals in both triangular; capsule globose, densely stellate. Sand: Utah—Nev. *Son.*—*Submont.* Ap—My.

2. *DITAXIS* Vahl.

Monoecious or rarely dioecious herbs or shrubs, often with rootstocks. Leaves alternate, silky or pilose, entire or rarely toothed, often strongly veined. Flowers in axillary and terminal clusters, usually bracted. Staminate flowers usually crowded at the ends of the racemes. Sepals 4 or 5, valvate. Petals 4 or 5. Stamens of the same number, or twice or thrice as many; filaments united into a column. Pistillate flowers with imbricate sepals and rudimentary petals. Ovary 3-celled, each cell with a solitary ovule. Styles 3, 2-cleft. Capsule 3-lobed, depressed, separating into three 2-valved carpels. Seeds subglobose, wrinkled or crested.

1. *D. humilis* (Engelm. & Gray) Pax. Perennial, with a woody root and caudex; stems much branched, pubescent, spreading, 1-3 dm. long; leaf-blades ovate, oblong, or oblanceolate, 1-3 cm. long, entire; capsule short-pedicelled, depressed, 4-6 mm. in diameter; seeds oval-globose, 2 mm. long, muricate. Prairies: Kans.—La.—Tex.—N.M. *Son.* My—O.

3. *TRAGIA* (Plum.) L.

Perennial monoecious herbs, or shrubs, usually armed with stiff, stinging hairs. Leaves alternate, entire, toothed, or lobed, mostly cordate, petioled. Flowers in racemes or spicate racemes, bracteolate, apetalous. Staminate flowers with 3-5 sepals, and mostly 1-3 stamens. Pistillate flowers with 3-8 sepals. Ovary 3-celled; ovules solitary. Styles 3, often united to above the middle. Capsule 3-lobed, separating into three 2-valved carpels. Seeds subglobose.

1. *T. ramosa* Torr. Light green perennial, with a woody caudex, hispid; stem 0.5-3 dm. high, usually much branched; leaf-blades lanceolate to triangular-lanceolate, 1-5 cm. long, coarsely and sharply serrate; staminate flowers with 4-5 sepals and 5-6 stamens; pistillate flowers solitary, with 5 sepals subtended by a 3-lobed bract; capsule depressed, 6-8 mm. thick, orange, more or less variegated. Dry soil: Mo.—Tex.—Ariz.—Colo. *Son.*—*Submont.* Ap—Au.

4. *CHAMAESYCE* S. F. Gray. SPURGE, CARPET-WEED.

Annual or perennial herbs, or in the tropics shrubs. Stems often radially branched at the base, ascending or prostrate, forking. Leaves opposite, entire or toothed, more or less oblique at the base; stipules delicate, entire or fringed. Involucres solitary in the axils or in axillary cymes. Glands 4, sessile or stalked,

naked or usually with an appendage; one sinus of each involucre usually glandless. Capsule 3-lobed, smooth, with sharp or rounded angles. Seeds angled, the faces smooth or transversely wrinkled.

Leaf-blades entire

Annuals or biennials

Plants prostrate, leaves oblong to orbicular

Leaf-blades manifestly longer than broad, usually more than twice as long.

Leaf-blades as broad as long or nearly so

Plants more or less ascending or erect, leaf-blades linear or linear-lanceolate

Capsule less than 1.5 mm. long.

Capsule about 2 mm. long or more

Appendages of the glands conspicuous, white.

Appendages inconspicuous, greenish white, or obsolete

Stems low and erect; stipules subulate-setaceous; seeds finely granu-

late, obscurely angled

Stems long and ascending, stipules triangular; seeds smooth, 3-angled.

1. *C. Geyeri*.

2. *C. serpens*.

3. *C. revoluta*.

4. *C. petaloidea*.

5. *C. Parryi*.

6. *C. flagelliformis*

Perennials.

Leaves glabrous.

Appendages fan-shaped, white, petaloid, stipules triangular, fimbriate

Appendages crescent-shaped or semi-orbicular, greenish, pinkish, or yellowish;

stipules subulate-setaceous

Appendages crescent-shaped, much narrower than the gland, leaves broadly

deltoid-ovate, seeds transversely ridged, plant prostrate

Appendages conspicuous, semi-orbicular, fully as broad as the glands;

leaves ovate or ovate-lanceolate; seeds irregularly pitted; plant erect

Leaves pubescent

Leaves toothed, but sometimes only at the apex, stems and branches prostrate; annuals.

Capsules glabrous

Seeds strongly transversely wrinkled

Seeds pitted or irregularly and faintly wrinkled.

Seeds deeply and irregularly pitted

Seeds faintly pitted or wrinkled

Leaves oblong, seeds usually with a white bloom.

Leaves linear, seeds brownish, usually without a bloom

11. *C. glyptosperma*

12. *C. rugulosa*

13. *C. serpyllifolia*.

14. *C. albicaulis*.

Capsule pubescent.

Leaf-blades and involucre glabrous or sparingly pubescent.

Leaf-blades and involucre copiously hirsute

15. *C. maculata*

16. *C. stictospora*.

1. ***C. Geyeri*** (Engelm.) Small. Plant green; stem branched at the base; branches 0.5–4 dm. long; leaf-blades oblong to ovate, 4–12 mm. long, obtuse, usually mucronulate, truncate or subcordate at the base; involucre turbinate, 1.5 mm. high; glands 0.3 mm. broad; appendages inconspicuous, white or red; seeds narrowly ovoid, 1.5 mm. long, nearly terete, ash-colored: *Euphorbia Geyeri* Engelm. On plains and prairies: Ill.—Mo.—Tex.—Neb.—Minn. *Plain* Je-S.

2. ***C. serpens*** (H.B.K.) Small. Plant pale green; stems branched at the base, 5–30 cm. long; leaf-blades orbicular to oval, 2–6 mm. long, obtuse or emarginate, rounded or subcordate at the base; involucre nearly 1 mm. high; appendages minute, irregular, crenate; capsules nodding, depressed-globose, 2 mm. broad; seeds 1 mm. long, smooth, obtusely 4-angled, light gray *E. serpens* H.B.K. On prairies and plains: Ont.—Fla.—Ariz.—S.D.; Mex. *Plain*—*Son.* Je-O.

3. ***C. revoluta*** (Engelm.) Small. Plant delicate; stem very slender, 8–20 cm. high; leaves few; blades narrowly linear, 1–3 cm. long, usually about 1 mm. broad, acute; involucre 1 mm. long; glands minute, broader than long, purple; appendages white or reddish, oblong or ovate, obtuse, entire; capsules about 1 mm. long, rather sharply 3-angled; seeds oblong, less than 1 mm. long, sharply 4-angled, the faces irregularly wrinkled. *E. revoluta* Engelm. Hillsides: Tex.—Colo.—N.M.; n Mex. *Son.* Jl—Au.

4. ***C. petaloidea*** (Engelm.) Small. Plant pale green; stem 1–6 dm. high; leaf-blades linear, oblong or linear-lanceolate, 1–2.5 cm. long, obtuse; involucre oblong-campanulate, 2 mm. long; glands about as long as the lobes; appendage white, reniform, ovate or suborbicular, entire or undulate; capsules globose-reniform, fully 2 mm. long; seeds oblong-ovoid, nearly 2 mm. long, ash-colored,

minutely pitted, nearly terete. *E. petaloidea* Engelm. Plains, in sandy soil: Ia.—Mont.—Tex. *Plain*. J1-S.

5. *C. Parryi* (Engelm.) Rydb. Plant pale; stems slender, about 1 dm. high; leaf-blades linear, acute or acutish at both ends, 1-2 cm. long, 1-2 mm. wide, rolled inward when drying; involucre 1.5-2 mm. long; appendages unequal, small, greenish, truncate; capsules sharp-angled; seeds 1.5 mm. long, ovate. *E. Parryi* Engelm. Loose sand: se Utah—Nev. *L. Son*.

6. *C. flagelliformis* (Engelm.) Rydb. Plant glabrous, pale; stems prostrate or ascending, branched, 1-4 dm. long; leaf-blades linear or oblong-linear, entire, acutish at both ends, 8-15 mm. long, 2 mm. wide; involucre broadly campanulate; glands 2-4, concave; appendages obsolete or a mere margin; capsule broadly triangular; seeds gray, acute. Sandy valleys: N.M.—Colo.—Utah—Ariz. *Son*.

7. *C. albomarginata* (T. & G.) Small. Plant glabrous; stems diffusely branched from the base, 2-15 cm. long; leaf-blades suborbicular or ovate-orbicular, 4-8 mm. long, truncate or subcordate at the base; involucre fully 1 mm. high; glands transversely oval; appendages irregular, entire or lobed; capsule globose-ovoid, 2 mm. long, sharply 3-angled; seeds oblong-ovoid, 1-1.3 mm. long. *E. albomarginata* T. & G. Dry soil: Tex.—Colo.—Utah—Calif.; Mex. *Son*. Mr-N.

8. *C. Greenei* (Millsp.) Rydb. Perennial from a woody root; stems numerous, prostrate, diffuse, branched, 1-2 cm. long; leaves 4-7 mm. long and nearly as broad, glabrous, very oblique; involucre 1.5-2.5 mm. long; glands thick, purple; appendages thick, minutely 2-lobed; capsules 2.5-3 mm. thick; seeds ovoid, white, angled. *E. Greenei* Millsp. Confused with *C. Fendleri*. Dry or sandy plains: Neb.—Wyo.—Colo.—Ida. *Plain—Submont*. Je-Au.

9. *C. Fendleri* (T. & G.) Small. Plant caespitose, usually pale green; stems erect or ascending, about 1 dm. high; leaf-blades ovate to lance-ovate, 4-6 mm. long, 2-5 mm. wide; involucre 1.5-2.5 mm. high; appendages yellowish or purplish, often crenate-toothed; capsule 3 mm. in diameter; seeds ovoid, 1.5 mm. long. *E. Fendleri* T. & G. Plains: Tex.—Ariz.—Utah. *Son*. Ap-O.

10. *C. lata* (Engelm.) Small. Stems branched from a woody root, spreading or ascending, 5-15 cm. long, pubescent; leaf-blades ovate to lanceolate, 5-10 mm. long, canescent-pubescent, revolute-margined; involucre 1 mm. long; appendages narrowly crescent-shaped, undulate; capsule rounded 3-angled, 2 mm. thick; seeds oblong, 1.5 mm. long, 4-angled and transversely wrinkled. *E. lata* Engelm. Plains: Kans.—Tex.—N.M.—Colo. *Son*.

11. *C. glyptosperma* (Engelm.) Small. Plant pale green, glabrous; stem 0.5-4 dm. long; leaf-blades oblong, linear-oblong, or rarely ovate, 2-12 mm. long, obtuse or subcordate at the base, serrulate towards the apex; involucre 1 mm. long, with 4 dark ribs; appendages narrow, crescent-shaped, often crenulate; capsule less than 2 mm. thick; seeds oblong, 1 mm. long, ash-colored, strongly 4-angled. *E. glyptosperma* Engelm. Sandy soil: Ont.—Mo.—Tex.—Mex.—B.C. *Plain—Submont*. My-S.

12. *C. rugulosa* (Engelm.) Rydb. Plant light green; leaf-blades oblong, elliptic, or oval, 5-8 mm. long, semi-cordate at base, serrulate above the middle; involucre turbinate-campanulate, 1 mm. long; appendages whitish, broadly crescent-shaped or semi-orbicular, usually lobed; capsule 1.5-2 mm. thick; seeds oblong-ovoid, obtusely angled, ash, with purplish pits, nearly 1 mm. long. *E. serpyllifolia rugulosa* Engelm. Sandy soil: s Calif.—Wyo.—Colo. Je-O.

13. *C. serpyllifolia* (Pers.) Small. Plant dark green or reddish; stems 1-4 dm. long; leaf-blades oblong or spatulate, 3-12 mm. long, obtuse or retuse, serrulate above the middle or nearly entire; involucre more than 1 mm. long, appendages narrow, crescent-shaped, lobed; capsules 2 mm. broad; seeds ovoid, hardly 1 mm. long, obtusely 4-angled. *E. serpyllifolia* Pers. Plains and in dry soil: Mich.—Tex.—Calif.—B.C.—Alta.; Mex. *Plain—Submont*. Ap-O.

14. *C. albicaulis* Rydb. Plant pale green; stems straw-colored or light greenish yellow, shining; leaf-blades linear, minutely callous-toothed towards the apex, 1-1.5 cm. long, 2-3 mm. wide; involucre about 1 mm. long, turbinate

appendages white, crescent-shaped, crenulate; pod 2 mm. thick; seeds light olive-brown, oblong, acutely 4-angled, 1.3-1.5 mm. long, less than 0.5 mm. broad. *E. albicaulis* Rydb. Cultivated or sandy soil: Neb.—Mont.—N.M. Plain. Jl—Au.

15. *C. maculata* (L.) Small. Plant dark green; stems 5-40 cm. long, often dark red, villous; leaf-blades oblong or ovate-oblong, 4-16 mm. long, more or less serrate, usually blotched, oblique, semi-cordate at base; involucre 1 mm. long; appendages semi-orbicular, white, crenulate; capsules about 2 mm. thick, pubescent; seeds ovoid-oblong, less than 1 mm. long, obtusely angled, ash-colored, minutely pitted and inconspicuously transversely wrinkled. *E. maculata* L. Dry ground and waste places: Ont.—Fla.—Tex.—Wyo.; introduced in Calif. Plain. Mr—O.

16. *C. stictospora* (Engelm.) Small. Plant yellowish green; stems 5-30 cm. long, villous; leaf-blades oblong to suborbicular, densely villous, 4-6 mm. long, obtuse, dentate-serrate above the middle; involucre campanulate, 1 mm. high; appendages narrow, crescent-shaped; capsules 1.5-2 mm. in diameter; seeds narrowly ovoid, 1.2-1.5 mm. long, pointed, pitted, ash-colored, sharply angled. *E. stictospora* Engelm. Dry soil: Kans.—Colo.—Ariz.—Tex.—Mex. Son. Ap—N.

5. ZYGOPHYLLIDIUM Small. SPURGE.

Annual herbs, with erect, forking stems. Leaves mostly opposite, narrow, equilateral, not oblique at the base. Stipules gland-like, often obsolete. Involucres short-peduncled in the upper forks. Glands 5, broader than long, with petal-like appendages. Capsule long-pedicelled, 3-lobed. Seeds terete, narrowed upwards, more or less papillose.

Leaves entire; appendages of the glands triangular-ovate
Leaves serrate, appendages of the glands semi-orbicular.

1. *Z. hexagonum*.
2. *Z. exstipulatum*.

1. *Z. hexagonum* (Nutt.) Small. Plant yellowish green; stem slender, 1-5 dm. high, with ascending almost filiform branches; leaves linear, oblong, or lanceolate, short-petioled; involucre 2-3 mm. long, ciliate; appendages green or whitish; capsule 4 mm. thick; seeds ovoid or oblong, 3 mm. long, terete, papillose. *Euphorbia hexagona* Nutt. On sandy prairies and river valleys: Ia.—Tex.—N.M.—Mont. Plain. Jl—S.

2. *Z. exstipulatum* (Engelm.) Woot. & Standl. Plant light green; stem erect, branched, glabrous, 1-3 dm. high; leaf-blades linear to lanceolate or on the branches ovate, sharply serrate, 1-3 cm. long, glabrous; involucre fully 1 mm. high; appendages white, 2-4-lobed; capsule rounded, 3 mm. thick; seeds ash-colored, tubercled and with 2-3 cross ridges, round-angled, 2 mm. long. *E. exstipulata* Engelm. *E. Alceae* A. Nels. Dry regions: Wyo.—Tex.—Ariz. Son.—Submont. Au—S.

6. LEPADENIA Raf. SNOW-ON-THE-MOUNTAIN.

Annual herbs, with erect stems. Leaves scattered below the umbel-like inflorescence, often very showy and petal-like in the inflorescence. Stipules fugaceous. Involucres campanulate; lobes fimbriate. Glands 5, peltate, with pink or white petal-like appendages. Capsule 3-lobed, pubescent, round-lobed. Seeds narrowed upwards, reticulate. [*Dichrophyllum* Kl. & Garke.]

1. *L. marginata* (Pursh) Niewl. Stout annual; stem 3-9 dm. tall, usually pilose; leaves ovate or obovate, 2-9 cm. long, sessile; bracts large, white-margined; involucre campanulate, 4 mm. long, usually pubescent; appendages reniform, white; capsule depressed-globose, 6 mm. in diameter, usually pubescent; seeds ovoid-globose, terete, 4 mm. long, dark ash-colored, reticulate-tuberculate. *E. marginata* Pursh. *Dichrophyllum marginatum* (Pursh) Kl. & Garke. Prairies, plains, and river valleys: Minn.—Tex.—Colo.—Mont.; introduced eastward. Plain—Submont. Jl—S.

7. TITHYMALUS (Tourn.) Adans. SPURGE.

Annual or perennial herbs, rarely shrubby, with simple or branched stems. Leaves below the inflorescence scattered, without stipules, entire or toothed,

same number, inserted on the margins of an indistinct disk, or very often wanting. Stamens 4-9, often 8. Gynoecium of two united carpels; styles united. Fruit of 2 winged carpels, united below (samaras).

Leaves palmately lobed or rarely palmately compound; flowers polygamous or perfect.

Leaves pinnately compound; flowers dioecious.

¹ ACER.
² NEGUNDO.

1. **ACER** (Tourn.) L. MAPLE.

Trees or rarely shrubs. Leaves opposite, petioled, more or less palmately lobed or cleft, rarely palmately compound. Flowers polygamous or rarely perfect, regular, in axillary or terminal racemes or corymbs. Sepals 4 or 5, rarely 6-9. Disk cup-shaped, lobed, or more commonly obsolete or wanting. Stamens 4-9. Petals as many as the sepals or wanting. Samaras 2, with reticulate wings.

Flowers in racemes or corymbs; petals and sepals both present; disk well developed; lobes of the leaves toothed

Flowers in long racemes, appearing after the leaves; leaves long-acuminate, with small lateral lobes; petals longer than the sepals ¹ *A. spicatum*

Flowers corymbose, appearing with the leaves; leaves not long-acuminate, deeply 3-5-cleft; terminal lobe only slightly larger, petals and sepals greenish, sub-equal

Bark of the one-year-old branches grayish; leaves and their lobes acuminate, not dotted beneath

Sinuses between the leaf-lobes shallow, open; terminal lobe broadly triangular-ovate. ² *A. Douglasii*

Sinuses between the leaf-lobes deep and narrow; terminal lobe rhombic. ³ *A. glabrum*

Bark of the one-year-old branches white; leaves and their lobes acute, not acuminate, with more or less numerous glandular red dots beneath ⁴ *A. tripartitum*

Flowers in umbels, appearing with the leaves, petals lacking, lobes of the leaves sinuate. ⁵ *A. grandidentatum*.

1. ***A. spicatum*** Lam. Shrub or small tree, sometimes 10 m. high, with thin smooth bark; twigs somewhat velutinous-puberulent or glabrate in age; leaf-blades longer than broad, cordate, 3-lobed, glabrate above, paler and pubescent beneath; petals linear or spatulate; samaras about 2 cm. long; wings ascending-spreading at about 90°; backs nearly straight. Rocky woods and mountain slopes: Newf.—Ga.—Minn.—Sask. *Boreal*. My-Je.

2. ***A. Douglasii*** Hook. Shrub or small tree, sometimes 10 m. high; twigs glabrous, purplish or red; older branches grayish; leaf-blades broadly cordate in outline, 3-10 cm. long and about as broad, 3-5-lobed, or on young shoots and vigorous twigs sometimes 3-divided to the base, glabrous on both sides; samaras 3-4 cm. long, ascending, usually incurved on the back; sinus usually rounded. *A. subserratum* Greene. Hills and mountain sides: Alta.—Wyo.—Ore.—B.C. *Submont.*—*Mont.* Ap-Je.

3. ***A. glabrum*** Torrey. Usually a small tree, 5-15 m. high; twigs glabrous, reddish; older branches gray; leaf-blades broadly cordate or rounded-reniform in outline, 4-8 cm. long, 4-10 cm. wide, glabrous, 5-7 lobed, or usually on young shoots and vigorous branches or sometimes on the whole tree 3-divided to the base; samaras 2.5-3 cm. long, usually straight on the back; sinus usually acute. *A. neomexicanum* Greene. Mountains, usually along streams: S.D.—N.M.—Utah—Wyo. *Submont.*—*Mont.* My-Je.

4. ***A. tripartitum*** Nutt. Shrub 1-5 m. high; twigs reddish, glabrous; leaf-blades rounded-reniform in outline, glabrous above, more or less puberulent beneath, shining, 3-5-lobed or -cleft or sometimes [as in the type specimens] 3-parted to the base, the terminal lobe more or less rhombic, coarsely toothed, 2-4 cm. long, 2-5 cm. wide; samaras 2-2.5 cm. long, ascending, incurved on the back, forming with each other a narrow angle. Dry hills: Wyo.—Utah—Calif. *Son.*—*Submont.* My-Je.

5. ***A. grandidentatum*** Nutt. Shrub or rarely a small tree, 5 m. high, with light brown twigs and gray branches; leaves reniform or orbicular in outline, deeply 3-5 lobed, with rounded sinuses, glabrous, pale and velutinous

beneath, 4-8 cm. long, 5-10 cm. wide; lobes rhombic-lanceolate; hypanthium long-hairy; samaras divergent, about 3 cm. long, forming with each other an angle of about 120°. Cañons: w Tex.—Wyo.—Ida.—Ariz. Son.—Submont. Ap—My.

2. NEGÚNDO (Ray) Ludwig. BOX-ELDER, ASH-LEAVED MAPLE.

Trees, with light green twigs, widely branching. Leaves opposite, odd-pinnate, usually with toothed leaflets. Flowers dioecious, appearing before the leaves, the staminate in drooping small clusters, the pistillate racemose. Sepals 4 or 5, very small. Petals wanting. Stamens 4 or 5. Disk obsolete. Samaras 2, with reticulate wings. [*Rulac* Adans.]

Branchlets glabrous, usually with a bloom; anthers acute, tapering into a tip one-half to one-fourth mm long. 1 *N. Nuttallii*.
Branchlets pubescent, anthers obtuse, merely mucronate
Wings of the carpels terminal, scarcely at all decurrent on the body; racemes seldom over 1 dm. long in fruit. 2 *N. interius*
Wings of the carpels extending down on the inner side almost to the bottom of the sinus, racemes in fruit 1.5-2 dm long. 3 *N. Kingii*.

1. *N. Nuttallii* (Nieuwl.) Rydb. Tree up to 15 m. high, with spreading branches; bark of the twigs and younger branches light green; leaflets usually 3, lanceolate or ovate, long-acuminate, usually rounded at the base, coarsely toothed or often more or less lobed, sparingly hairy or in age glabrate above, more densely so beneath, and often with tufts of hairs in the axils of the veins; fruit glabrous, gradually tapering below; wing scarcely decurrent. River valleys: Mich.—Ia.—Kans.—Colo.—Mont.; often cultivated. Plain. Ap—My.

2. *N. interius* (Britton) Rydb. Tree up to 12 m. high; leaflets lanceolate or ovate, or the terminal rhombic, 5-12 cm. long, long-acuminate, usually lobed, coarsely toothed, otherwise as in the preceding; fruit as in the preceding. *A. interior* Britton. Along streams and in cañons, mostly in the foot-hills and mountains: Sask.—Man.—Neb.—N.M.—Ariz.—Mont. Plain—Submont. My—Je.

3. *N. Kingii* (Britton) Rydb. Tree perhaps 10 m. high; twigs grayish green; leaflets lanceolate, long-acuminate, 5-10 cm. long; pubescence as in the preceding; fruit glabrous; wings less spreading than in the two preceding. *A. Kingii* Britton. Cañons: Utah—(? Ariz.). Submont.—Mont. My—Je.

FAMILY 79. RHAMNACEAE. BUCKTHORN FAMILY.

Shrubs or trees, with alternate, rarely opposite, simple, usually several-ribbed leaves and small stipules. Flowers greenish, perfect or polygamous, rarely dioecious. Sepals 4 or 5, valvate. Hypanthium somewhat developed, lined or filled with a thickened disk. Petals 4 or 5. Stamens of the same number, inserted on the disk, opposite the petals. Gynoecium of 2 or 3 united carpels; ovary 2- or 3-celled, partly immersed in the disk. Styles and stigmas more or less united. Fruit a capsule, a drupe, or rarely a samara.

Fruit pulpy; petals small, clawless, or wanting; stigmas usually 2.
Fruit dry, petals hooded and long-clawed; stigmas 3.

1. RHAMNUS.
2. CEANOTHUS.

1. RHAMNUS (Tourn.) L. BUCKTHORN.

Shrubs or trees, unarmed, or with spinose branchlets. Leaves alternate, entire or toothed, several-ribbed; stipules deciduous. Flowers perfect or polygamo-dioecious, axillary, often clustered, in racemes, cymes or umbels. Sepals 4 or 5, keeled within. Disk cup-shaped, lining the hypanthium. Petals 4 or 5, or wanting, clawless, inserted on the margin of the disk. Stamens of the same number, on the edge of the disk; filaments very short. Ovary 2-4-celled; styles 2-4, united at the base. Drupe berry-like, with 3-4 nutlets. Endosperm fleshy.

Flowers solitary or in sessile umbels, usually polygamo-dioecious or dioecious; winter-buds scaly.

Shrub spinose; introduced species.

1. *R. carthartica*.

Shrub not spinose; native species.

Flowers 4-merous; petals present, seeds 2, grooved, leaves not strongly velvety

Leaves broadly lanceolate, acuminate with a blunt apex 2 *R. lanceolata*.

Leaves narrowly lanceolate, not acuminate. 3 *R. Smithii*.

Flowers 5-merous, apetalous, seeds 3, scarcely grooved, leaves strongly velvety.

4 *R. alnifolia*

Flowers in peduncled umbels or corymbs, perfect; winter-buds not scaly, pubescent

Peduncles longer than the pedicels; leaves merely callous-denticulate 5 *R. Purshiana*.

Peduncles shorter than the pedicels, sometimes almost none, leaves finely but distinctly serrate. 6 *R. betulaeifolia*.

1. *R. carthartica* L. Shrub or low tree, 2-7 m. high, with rough bark; leaves petioled; blades glabrous or nearly so, broadly ovate or oval, 3-6 cm. long, crenate; flowers dioecious, greenish, 4-merous; petals lanceolate; drupe globose, about 8 mm. in diameter; seeds 3-4, grooved. Around dwellings: Ont.—Va.—Colo.; cult. and occasionally escaped; native of Eu. Je.

2. *R. lanceolata* Pursh. Unarmed shrub or small tree; leaves short-petioled; blades lanceolate or ovate-lanceolate, acuminate, with a blunt apex, minutely crenate, glabrous above, puberulent beneath, 3-8 cm. long; flowers 2-3 in the axils of the leaves, greenish, dioecious; petals lanceolate, shorter than the sepals; drupe black, 6 mm. in diameter. Wet ground: Pa.—Ala.—Tex.—Neb. *Plann.* My-Je.

3. *R. Smithii* Greene. Unarmed shrub, with densely leafy branches and yellowish or grayish bark; leaves short-petioled; blades yellowish green, lanceolate, obtuse or acutish, finely crenate, 2-4 cm. long; flowers greenish, dioecious; drupe subglobose, 6-7 mm. in diameter, black. Mountain valleys: Colo.—N.M.—Ariz.—Utah. *Submont.* Je.

4. *R. alnifolia* L'Hér. Unarmed shrub, 1-2 m. high; branches gray, finely pubescent; leaves short-petioled; blades oval or elliptic, from obtuse to somewhat acuminate, coarsely crenate-serrate, finely pubescent when young, soon glabrate, 3-10 cm. long, strongly veined; flowers solitary or 2 or 3 umbellate; sepals spreading; drupe black, 7-8 mm. in diameter. Swamps: Me.—N.J.—Wyo.—n Calif.—B.C. *Submont.* My-Jc.

5. *R. Purshiana* DC. Unarmed shrub or small tree, 3-10 m. high; leaves short-petioled; blades broadly oval, rounded or subcordate at the base, obtuse or abruptly short-acuminate, 3-12 cm. long, short-villous beneath and on the veins above; flowers 5-merous, perfect; petals minute; drupe depressed-globose, purple or black, 3-seeded; seeds plano-convex, without a groove. Woods: Mont.—Calif.—B.C. *Submont.* My-Je.

6. *R. betulaeifolia* Greene. Unarmed low shrub, 1-3 m. high; branches pubescent; leaves short-petioled; blades oval or elliptic or obovate-lanceolate, acute or obtuse at the apex, 5-10 cm. long, puberulent and in age glabrate above, pubescent beneath, especially on the strong veins; flowers corymbose, few; drupe purplish black, 8 mm. broad, 3-seeded. Under cliffs and along streams: N.M.—Ariz.—s Utah. *Son.—Submont.* My-Jl.

2. *CEANOTHUS* L. NEW JERSEY TEA, MOUNTAIN LAUREL.

SNOW BRUSH, DEER BRUSH.

Shrubs or small trees, often with spinulose branches. Leaves alternate, commonly 3-ribbed; stipules caducous. Flowers perfect, crowded in terminal panicles, cymes, or umbels. Hypanthium urn-shaped, filled by the disk. Sepals 5, deciduous, white. Petals 5, inserted under the disk, long-clawed and strongly hooded. Stamens 5; filaments filiform, exerted. Ovary immersed in the disk, 3-celled. Styles short, united below; stigmas 3. Fruit dry, 3-lobed, separating into 3 nutlets. Seeds flattened; endosperm fleshy.

Leaves alternate, thin, triple-nerved

Leaf-blades rounded-oval, often cordate at the base, closely glandular-dentate or crenate

Peduncles often naked from lateral buds; leaves sparingly pubescent beneath, soon glabrate

Leaves 3-6 cm. long; young branches long-hairy, soon glabrate

1. *C. sanguineus*.

Leaves 1-2.5 cm. long; young branches finely puberulent. 2. *C. Martini*.

nearly so, about 2.5 cm. long, cuneate and slightly emarginate. *Sphaeralcea Crandallii* Rydb. Mountains: Colo. *Submont.*

2. *P. rivularis* (Dougl.) Rydb. Stem 6–20 dm. high, sparingly stellate, leaf-blades cordate or reniform in outline, 5–7-lobed, 5–15 cm. long and about as wide; lobes triangular or broadly lanceolate, usually coarsely toothed; pedicels and calyx stellate; petals pink or white, 2–2.5 cm. long. *S. rivularis* Torr. *I. rivularis* and *I. angulata* Greene. Along streams: Alta.—S.D.—Colo.—Nev.—B.C. *Submont.*—*Mont.* JI–S.

3. *P. acerifolia* (Nutt.) Rydb. Stem 5–10 dm. high; leaf-blades cordate or reniform in outline, 5–7-lobed, 5–10 cm. broad; lobes triangular, coarsely serrate; petals rose-colored, 2–2.5 cm. long. *Sphaeralcea acerifolia* Nutt. Along streams: *Mont.*—*Ida.*—*Ore.* *Submont.* Je.

4. *P. grandiflora* Rydb. Stem glabrous below, stellate above, 1–2 m. high; blades cordate or reniform in outline, 9–15 cm. wide, deeply 5–7-lobed; lobes lanceolate or triangular, coarsely toothed, with triangular teeth; pedicels and calyx densely hirsute-pubescent, with long stellate hairs; petals pinkish, 3 cm. or more long. *Sphaeralcea grandiflora* Rydb., not Phil. Mountains: Colo.—Utah. *Submont.*—*Mont.* Je.

6. **EREMÁLCHÉ** Greene.

More or less hispid or hirsute annuals, not stellate. Leaves alternate, reniform, palmately ribbed, crenate or lobed. Flowers solitary, axillary, long-peduncled, subtended by 3 slender bractlets. Sepals 5, partially united. Petals 5, purplish. Stamens monadelphous, in a single series. Carpels orbicular, rugose, pointless, closely investing the single seed.

1. *E. exilis* (A. Gray) Greene. Annual; stem branched, spreading or decumbent, more or less pubescent, with branched hairs; leaves long-petioled, blades reniform, 5–7-lobed, 1–2 cm. wide; lobes cuneate, with 3–5 rounded teeth; sepals triangular-lanceolate, acuminate; petals white or pink, 6–10 mm. long; carpels 2 mm. long, reniform, with thick rugose backs *Malvastrum exile* A. Gray. Sandy places: Ariz.—s Utah—Calif.; n Mex. *L. Son.* Ap–Je.

7. **DISÉLLA** Greene.

Canescent, stellate perennials. Leaves alternate, pubescent, reniform, or hastate. Flowers perfect, solitary or clustered in the axils of the leaves. Bractlets 1–3. Sepals 5, united into a usually angular base. Petals 5; carpels five to many, 1-celled. Styles filiform; stigmas capitate. Carpels 1-seeded, indehiscent or partially 2-valved, obtuse or short-acuminate. Seeds pendulous, 3-angled.

Leaves reniform or orbicular.
Leaves lanceolate, hastate.

1. *D. hederacea*
2. *D. sagittaeifolia*

1. *D. hederacea* (Dougl.) Greene. Perennial, with a caespitose caudex or rootstock; stems decumbent or spreading, branched, 1–4 dm. long, scurfy-canescens; leaf-blades reniform or suborbicular, dentate, scurfy-canescens, 1–5 cm. wide; petals pale yellow or white, about 1 cm. long; fruit short-conic, tomentulose. *Sida hederacea* (Dougl.) Torr. Low banks and salt-flats: Wash.—Utah—Ariz.—w Tex.—Mex. *Son.*—*Submont.* Je–S.

2. *S. sagittaeifolia* (A. Gray) Greene. Caespitose perennial; stems spreading or decumbent 1–4 dm. long, scurfy-lepidote; leaf-blades sinuate-dentate, 2–5 cm. long, scurfy-lepidote, silvery when young; petals yellowish white, tinged with rose or purple, about 12 mm. long; fruit depressed. *Sida lepidota sagittaeifolia* A. Gray. Plains: w Tex.—s Colo.—s Calif.; n Mex. *Son.* My–N.

8. **ABÜTILON** (Tourn.) Mill. INDIAN MALLOW, VELVET LEAF.

Herbs (ours), shrubs, or trees. Leaves alternate, softly pubescent, entire, toothed, or lobed, usually cordate at the base. Flowers perfect, mostly axillary. Involucel wanting. Sepals 5, united below. Petals 5, distinct, usually yellow. Styles filiform or club-shaped, with terminal stigmas. Carpels 1-celled, leathery

or parchment-like, more or less prominently beaked, 2-valved at the apex and on the back, with 1-6 reniform seeds.

1. **A. parvulum** A. Gray. Cespitose perennial, with woody base; stems 2-4 dm. high, cinctuous-stellate, spreading; leaf-blades rounded to ovate-cordate, dentate, sometimes obscurely 3-lobed, 1-3 cm. long, stellate-canescens; flowers axillary; calyx-lobes 3-4 mm. long, lanceolate, in fruit reflexed; petals 3-5 mm. long, brick-red or pinkish; fruit 7-8 mm. long and about as wide, minutely stellate. Dry soil: Tex.—Colo.—Ariz. Ap-S.

FAMILY 82. **HYPERICACEAE.** ST. JOHN'S-WORT FAMILY.

Herbs or shrubby plants, with opposite, rarely whorled, entire or nearly so, pellucid-punctate leaves, without stipules. Flowers cymose, perfect, regular or nearly so. Sepals 4 or 5, herbaceous, equal or unequal. Petals 4 or 5, yellow or flesh-colored. Stamens few or many, usually 3- or 5-delphous. Gynoecium of several united carpels. Ovary 1-celled, with parietal placentae, or 3-7-celled, with central placentae. Styles distinct or united; stigmas often capitate. Fruit a septicidal capsule.

1. **HYPERICUM** (Tourn.) L. ST. JOHN'S-WORT.

Herbs (all ours), or shrubs. Leaves opposite, rather thick, usually sessile, entire or nearly so, more or less punctate. Flowers cymose. Sepals 5, slightly unequal. Petals 5, yellow, convolute. Stamens numerous, more or less distinctly 3- or 5-delphous. Ovary 1-celled, with 3 (all ours) or 5 parietal placentae, or 3- or 5-celled. Styles 3-5, sometimes coherent. Seeds numerous.

Petals more than twice as long as the sepals, both usually margined with black glands; stamens numerous, erect perennials.

Sepals acuminate or at least decidedly acute

Sepals obtuse or acutish.

Stem 3-5 dm. high, petals 8-10 mm. long.

Stem about 1 dm. high, petals 10-15 mm. long.

Petals slightly exceeding the sepals, black glands none; stamens 5-20, annuals or no. 4 often perennial, rooting at the nodes

Procumbent, often forming mats; leaves broadly oval.

Erect and simple; leaves oblong to lanceolate.

1. *H. formosum*.

2. *H. Scouleri*.

3. *H. Nortonae*.

4. *H. anagalloides*.

5. *H. majus*.

1. **H. formosum** H.B.K. Perennial, with a horizontal rootstock; stem simple, 3-6 dm. high; leaves oval or elliptic, 2-3 cm. long, sessile; sepals 4-5 mm. long, black-dotted on the margin and usually also on the back, acuminate or acute; petals 10-12 mm. long, oval; capsule 3-lobed, 8 mm. long; stamens numerous. Mountains and hillsides: N.M.—Wyo.—s Calif.—Mex. *Submont.*—*Mont.* Jl-Au.

2. **H. Scouleri** Hook. Perennial, with a horizontal rootstock; stem 4-gonous above, 2-5 dm. high; leaves oblong or elliptic to ovate, somewhat clasping, 1-2 cm. long, sepals ovate, obtuse, with a few black dots along the margin; petals 8-10 mm. long, oval; capsule 3-lobed; stamens numerous. Copses and hillsides: *Mont.*—Wyo.—Calif.—B.C. *Submont.*—*Mont.*

3. **H. Nortonae** M. E. Jones. Perennial, with a slender rootstock; stem barely angled; leaves oval or rounded-oval, obtuse, 1.5-2.5 cm. long, cordate at the base; flowers 1-3; sepals ovate-obtuse, about 2.5 mm. long; petals narrow, strongly many-nerved; pod 3-lobed at the apex. Moist alpine places: *Mont. Alp.*

4. **H. anagalloides** Cham. & Schlecht. Diffusely branched annual or perennial, rooting at the nodes; branches 5-30 cm. long, procumbent or ascending; leaves elliptic to broadly oval, 5-7-ribbed, 5-15 mm. long, not dotted; sepals elliptic, unequal; petals 3-4 mm. long, oval; stamens 15-21, in 3 clusters; capsule 1-celled, ovate. *H. tapetoides* A. Nels. Wet ground: B.C.—*Mont.*—*Ida.*—L. Calif. Je-Jl.

5. **H. majus** (A. Gray) Britton. Erect annual, simple below; stem 2-9 dm. high; leaves lanceolate or oblong-lanceolate, 2-6 cm. long, 5-7-ribbed; sepals

lanceolate, acuminate; petals oval or obovate, 2-3 mm. long; stamens 5-10; capsule narrowly conic. *H. canadense majus* A. Gray. Wet places: Me.—N.J.—Colo.—Wash.—B.C. *Plain—Submont.* J1—Au.

FAMILY 83. ELATINACEAE. WATER-WORT FAMILY.

Herbs or shrubby plants, ours low water herbs, with opposite or whorled leaves, with stipules. Flowers inconspicuous, perfect, regular, solitary or clustered in the axils of the leaves. Sepals 2-5, imbricate. Petals as many, hypogynous. Stamens 2-5, or sometimes 10. Gynoecium of 2-5 united carpels. Ovary 2-5-celled, with central placentac; stigmas 2-5, distinct. Fruit a septicidal capsule.

1. ELATINE L. WATER-WORT, MUD-PURLANE.

Low water plants. Leaves opposite or whorled, entire. Flowers usually solitary, axillary. Sepals 2-4, membranous, obtuse, nerveless. Petals and stamens as many as the sepals or the latter twice as many. Ovary and fruit 2-4-celled. Styles 2-4. Capsule membranous, 2-4-valved.

Flowers sessile; stamens 2-3, as many as the petals.

Leaves oblanceolate, flowers usually 3-merous.

Leaves obovate

Flowers 3-merous, plant red; leaves 2 mm. long

Flowers 2-merous, plant green, leaves 4-6 mm. long.

Flowers pedicelled; stamens 6-8, twice as many as the sepals and petals.

1. *E. triandra*.

2. *E. rubella*.

3. *E. americana*.

4. *E. Williamsii*.

1. *E. triandra* Schkur. Immersed water plant, flaccid; stems 5-10 cm. long; leaves opposite, oblong or oblanceolate; flowers sessile; sepals usually 2; seeds slightly curved, little sculptured. Shallow water: Ill.—Colo.—Wash.; Eu. *Plain—Submont.*

2. *E. rubella* Rydb. Low and depressed annual, whole plant reddish; stems scarcely more than 5 mm. long; leaves opposite, broadly obovate-spatulate, fleshy; flowers sessile; pod depressed-globose, 1.5 mm. in diameter; seeds curved, sculptured as in the next. Wet volcanic sand: Yellowstone National Park. *Mont.*

3. *E. americana* (Pursh) Arn. Diffuse rooting annual; stems 1-4 cm. long; leaves obovate, very obtuse, 2-6 mm. long; petals in the terrestrial form rose-colored; pod globose, 1 mm. in diameter; seeds slightly curved, sculptured with 9-10 longitudinal and 20-30 cross-bars. Mud and shallow water: Que.—Va.—Tex.—Calif.—B.C. *Plain—Submont.* J1—S.

4. *E. Williamsii* Rydb. Slender diffuse annual; stems 3-5 cm. long; leaves broadly spatulate, distinctly petioled, 5-8 mm. long, thin, indistinctly 3-nerved; flowers on pedicels 1-2 mm. long; capsule 1.5 mm. in diameter; seeds curved into a hook, less than 0.5 mm. long, with numerous cross-lines. Shallow water: *Mont.* Au—S.

FAMILY 84. FRANKENIACEAE. FRANKENIA FAMILY.

Low herbs or undershrubs, with opposite or whorled, entire, thick leaves, with a stipular membrane connecting their bases. Flowers small, perfect, regular. Sepals 4 or 5, united into a tube. Petals as many, clawed. Gynoecium of 3 or 4 united carpels; ovary 1-celled, with as many parietal placentae. Fruit a capsule, septicidal, enclosed in the calyx.

1. FRANKENIA L.

Characters of the family.

1. *F. Jamesii* Torr. Erect shrub, 3-6 dm. high, thickly branched; branches scabrous-puberulent; leaves nearly glabrous, linear, 5-10 mm. long, with revolute margins, fascicled; petals white; blades 4 mm. long, cuneate, erose-truncate;

stamens usually 6; anther-cells elongate, oblong. Bluffs and plains: w Tex.—Colo.—Sonora. *Son.* Je-Jl.

FAMILY 85. **CISTACEAE.** ROCK-ROSE FAMILY.

Shrubs or undershrubs. Leaves alternate or opposite. Flowers nearly regular, usually perfect, solitary, racemose, clustered, or paniculate. Sepals 3-5, persistent. Petals 5 or 3, sometimes wanting, fugaceous. Stamens 8, hypogynous. Gynoecium of several united carpels; ovary sessile, 1-several-celled; ovules orthotropous; styles united; stigma entire or 3-lobed. Fruit a capsule. Seeds several or numerous. Embryo slender; endosperm starchy or fleshy

1. **CROCANTHEMUM** Spach. FROST-WEED.

Undershrubs. Leaves more or less coriaceous, entire, flat or revolute-margined. Flowers of two kind, viz, some with large fugaceous petals and many stamens, the others cleistogamous, apetalous or with small petals, and 3-10 stamens. Styles obsolete or short; stigmas capitate or 3-lobed. Fruit a capsule. Embryo curved.

1. **C. majus** (L.) Britton. Hoary canescent herbs, slightly woody at the base, 3-6 dm. high; leaves oblanceolate or oblong-lanceolate, 1.5-3.5 cm. long, stellate on both sides, canescent beneath, greener above; petaliferous flowers 5-12, in terminal cymes; sepals densely canescent, the outer nearly as long as the inner, petals yellow, 7-9 mm. long, oval; apetalous flowers clustered in the axils of the leaves, nearly sessile. *Helianthemum majus* (L.) B.S.P. *H. canadense* Walkerae W. H. Evans. Dry soil: Me.—Va.—Tex.—Colo.—S.D. Plain—Submont. Jl—Au.

FAMILY 86. **VIOLACEAE.** VIOLET FAMILY.

Low herbs, or in the tropics woody. Leaves simple, alternate or basal, with stipules. Flowers perfect, irregular. Sepals and petals 5; the latter imbricate in bud, the lowermost spurred or saccate at the base. Stamens 5; anthers united or connivent. Gynoecium of 3 united carpels. Ovary 1-celled, with 3 parietal placentae. Capsule loculicidal; seeds anatropous.

Sepals auricled at the base; corolla spurred. 1. **VIOLA.**
Sepals not auricled at the base, lowest petal merely saccate at the base. 2. **CALCEOLARIA.**

1. **VIOLA** (Tourn.) L. VIOLET, HEARTS-EASE, PANSY.*

Usually perennial herbs, either bearing leaves and 1-flowered scapes from the crown of the rootstock, or stemmed, with manifest internodes between the leaves, and with axillary 1-flowered peduncles. Flowers usually of two kinds, those of spring with showy petals and those of summer with petals rudimentary or lacking, the latter never opening, but self-fertilized within the closed calyx; petaliferous flowers nodding, pentamerous and irregular as to calyx, corolla and stamens. Sepals 5, persistent in fruit, auricled at the base. Petals 5, the lowest one spurred. Stamens distinct, but more or less coherent, the two lower furnished with nectar-bearing appendages projecting into the spur. Capsule ovoid to cylindric, 3-valved, bearing 20-60 obovate seeds 1-3 mm. long.

Plants acaulescent, or without manifest stems.

Plants without stolons.
Flowers violet-purple.

Rootstock thick.

Leaves not lobed nor parted

Leaves and scapes glabrous.

Spurred petal glabrous, rounded at the apex.

Peduncles of cleistogamous flowers usually 1-3 cm. long, prostrate under the soil or dead leaves. 1. **V. papilionacea.**

* Contributed by Prof. Ezra Brainerd.

- Peduncles of cleistogamous flowers usually 4-6 cm long, erect or ascending. 2. *V. pratincola*.
 Spurred petal more or less bearded, retuse or emarginate.
 Spurred petal somewhat bearded, mostly retuse 3. *V. retusa*.
 Spurred petal thickly bearded, emarginate. 4. *V. nephrophylla*.
 Leaves and scapes hirsutulous. 5. *V. septentrionalis*.
 Leaves 2-3-ternately parted. 6. *V. pedatifida*.
 Rootstock slender. 7. *V. Selkirkii*.
 Flowers white. 8. *V. renifolia*.
 Plants stoloniferous.
 Flowers not yellow.
 Flowers white or lilac; petioles glabrous. 9. *V. palustris*.
 Flowers white; petioles after flowering pilose. 10. *V. Macloskeyi*.
 Flowers yellow.
 Stolons several, long, prostrate, leafy 11. *V. sempervirens*.
 Stolons few, short, ascending, with 1-3 leafy bracts. 12. *V. orbiculata*.
 Plants caulescent, or with manifest stems.
 Leaves compound or much dissected.
 Upper petals deep violet, the lower pale violet, with yellow base.
 All the petals pale yellow 13. *V. Beckwithii*.
 Leaves simple, not dissected 14. *V. Sheltonii*.
 Flowers yellow.
 First peduncles from the base of the stems.
 Basal leaves round, 5-7-lobed or -toothed. 15. *V. venosa*.
 Basal leaves ovate to lanceolate, denticulate.
 Basal leaves 5-9 cm. long, ovate to elliptic. 16. *V. linguaefolia*.
 Basal leaves 2-5 cm. long.
 Basal leaves narrowly ovate, obtuse. 17. *V. callicola*.
 Basal leaves lanceolate, acute or subacute. 18. *V. Nuttallii*.
 First peduncles from the upper half of the stem.
 Style and lateral petals beardless. 19. *V. biflora*.
 Style and lateral petals bearded.
 Upper part of stem and its leaves nearly glabrous 20. *V. glabella*.
 Upper part of stem and its leaves densely short-pubescent 21. *V. pubescens*.
 Flowers not yellow.
 Petals white on the inner face, with a yellow base, on the outer face usually purplish.
 Underground stolons present 22. *V. rugulosa*.
 Stolons lacking.
 Stems usually 15-35 cm. high. 23. *V. canadensis*.
 Stems usually 10-15 cm. high. 24. *V. scopulorum*.
 Petals violet or purple.
 Stipules sharply or bristly toothed; perennials.
 Plant dwarf; leaves cuneate, glabrous 25. *V. belhdfolia*.
 Plant over 1 dm. high, usually puberulent.
 Leaves 2-3 cm. long, seeds 1.5 mm. long. 26. *V. adunca*.
 Leaves 3-5 cm. long, seeds 2 mm. long. 27. *V. montanensis*.
 Stipules leaf-like, pectinate at base, annuals 28. *V. Rafinesquii*.

1. ***V. papilionacea*** Pursh. Plants robust and hardy from a stout branching rootstock, usually glabrous, but petioles sometimes sparsely pubescent; blades when fully grown often 12 cm. wide, reniform or broadly ovate-cordate, acute or abruptly pointed; outer sepals ovate-lanceolate; upper and lateral petals broadly obovate, 8-10 mm. wide. Fields and groves: Mass.—Ga.—Okla.—Minn.; apparently introduced in gardens and along irrigation ditches in Denver, Colo., and vicinity.

2. ***V. pratincola*** Greene. Plant every way smaller than the preceding; leaves deeply cordate-ovate, tapering gradually to a subacute apex, 2-3 cm. wide at petaliferous flowering, 5-8 cm. wide at maturity; petals spatulate, 4-6 mm. wide; peduncles taller than the leaves. Hills and prairies: Colo.—Wyo.—N.D. *Plain*—*Submont.*

3. ***V. retusa*** Greene. Glabrous throughout; leaves at flowering time broadly cordate-deltoid, finely serrate; later leaves much dilated, with a shallow sinus, more or less decurrent on the petiole, often abruptly acuminate; cleistogamous flowers on erect peduncles; capsules ellipsoid, green; seeds brown, 2 mm. long. Borders of streams: Kans.—Colo. *Plain*. My-Je.

4. ***V. nephrophylla*** Greene. Leaves broadly cordate-ovate to reniform, obtuse or bluntly short-pointed; petals large, the upper pair often sparsely pubescent; sepals ovate to lanceolate, obtuse; cleistogamous flowers on erect

15 cm. long; flowers vespertine; petals 2 cm. long, oblanceolate, sometimes whitish without, golden yellow within; staminodia about half their size; capsule fully 2 cm. long. *M. aurea* and *M. speciosa* Osterhout. Hills and dry valleys: Colo.—Wyo. *Submont.*—*Mont.* Jl—Au.

12. *N. chrysantha* (Engelm.) Greene. Decumbent biennial 3–4 dm. high; stems stout, white-pubescent, much branched; lower leaves 10–15 cm. long, lanceolate or oblanceolate; upper leaves broadly lanceolate, or even ovate; petals 15–20 mm. long, oblanceolate; staminodia similar; capsule 2.5–3 cm. long. *T. sinuata* Rydb. *N. sinuata* Daniels. Cañons: Colo. *Submont.* S.

13. *N. rusbyi* (Wooton) Rydb. Erect biennial; stem stout, scabrous, 1–1.5 m. high; lower leaves long-lanceolate, 1–2 dm. long, sinuate-dentate, with triangular teeth; flowers with two pinnatifid bracts; petals light yellow, oblanceolate, acute, 16–20 mm. long; petaloid staminodia narrower and shorter; capsule 3 cm. long, acute at the base; seeds winged. *M. Rusbyi* Wooton. Plains and valleys: N.M.—Wyo.—Ariz. *Son.*—*Submont.* Je—S.

14. *N. nuda* (Pursh) Greene. Stout perennial or biennial; leaves oblanceolate, 5–15 cm. long, sinuately lobed, with oblong or ovate lobes, less hispid above; petals spatulate, acute, about 2 cm. long; staminodia nearly as large, similar; capsule about 3 cm. long; seeds winged. *Bartonia nuda* Pursh. *M. nuda* T. & G. Plains and hillsides: w Neb.—Colo.—Wyo. *Plain*—*Submont.* Jl—Au.

15. *N. stricta* (Osterhout) Greene. Strict, rather simple perennial; stem 5–10 dm. high, branched above; leaves linear-lanceolate, 5–10 cm. long, sinuately toothed, with triangular teeth; petals oblanceolate, acute, 2.5–3.5 cm. long; petaloid staminodia similar; capsule 2–3 cm. long; seeds wing-margined. *Hesperaster strictus* Osterhout. Plains and foot-hills: w Neb.—Tex.—Colo.—Wyo. *Plain*—*Submont.* Je—O.

16. *N. decapetala* (Pursh) Greene. Stout biennial; stem 5–10 dm. high, leafy, very scabrous; lower leaves oblanceolate, 1–3 dm. long, the upper lanceolate, pinnately lobed, with lanceolate lobes; flowers subtended by several pinnatifid bracts; petals 4–5 cm. long, oblanceolate, acute; petaloid staminodia almost as large; capsule about 4 cm. long; seeds with a narrow wing. *Bartonia decapetala* Pursh. *M. ornata* T. & G. Cañons: S.D.—Tex.—Nev.—Alta. *Plain*—*Submont.* Jl—S.

17. *N. laevicaulis* (Dougl.) Greene. Stout biennial; stem 3–10 dm. high; lower leaves oblanceolate, sinuately dentate, with triangular teeth, 1–1.5 cm. long; upper stem-leaves ovate-lanceolate, densely scabrous; flowers diurnal, subtended by toothed bracts; petals narrowly oblanceolate, 5–6 cm. long; seeds wing-margined. *Bartonia laevicaulis* Dougl. *M. laevicaulis* T. & G. Cañons and river valleys: Wash.—Ida.—Utah—Calif. *Son.*—*Submont.* Je—Au.

18. *N. acuminata* Rydb. Stout biennial; stem 3–10 dm. high, straw-colored; lower leaves oblanceolate, 1–2 dm. long, sinuately dentate, densely scabrous, with triangular teeth; upper stem-leaves lanceolate, pinnatifid, with lanceolate or rarely triangular lobes; flowers diurnal, their bracts narrowly linear, entire or with a few narrow lobes; capsule 4 cm. long; seeds winged. River valleys: Wash.—Mont.—Wyo.—Utah. *Son.*—*Submont.* Je—S.

19. *N. parviflora* (Dougl.) Greene. Divaricately branched biennial; stem white; lower leaves oblanceolate, coarsely sinuately toothed, with triangular teeth; the upper lanceolate; flowers diurnal; bracts narrowly linear, mostly entire; petals oblanceolate, 2.5–3 cm. long; capsule about 2 cm. long; seeds winged. *Bartonia parviflora* Dougl. (?) *M. Brandegee* S. Wats. Along rivers: B.C.—Wash.—Ore. *Son.*—*Submont.* Je—Jl.

3. ACROLASIA Presl.

Scabrous pubescent annuals. Leaves alternate, rarely some opposite, narrow, from entire to pinnatifid. Sepals 5, persistent. Petals 5, yellow, rather inconspicuous. Stamens many, free, or nearly so; filaments filiform. Hypan-

thium cylindric; placentae 3, filiform; ovules 10-40, in a single row on each placentae. Capsule slender, linear-cylindric or linear-clavate. Seeds rather few, pendulous, more or less prismatic, muricate, not striate, not separated from each other by horizontal lamellae.

Inflorescence congested, bracts broad, 3-lobed, membranous at the base

1. *A. congesta*.

Inflorescence open; bracts neither 3-lobed nor membranous.

Seeds rather strongly muricate, upper leaves narrow; sepals lanceolate-subulate, half as long as the petals or longer.

Petals 3-6 mm. long

Leaves pinnatifid with many lobes; petals 5-6 mm. long.

Leaves divided to near the midrib, with ascending lobes; plant erect.

2. *A. gracilis*.

Leaves divided one-half or one-third to the midrib, with divergent lobes; plant ascending or diffuse

3. *A. ctenophora*.

Only the middle leaves pinnatifid with few lobes, or seldom all entire, petals

3-4 mm long

4. *A. albicaulis*.

Petals 2-3 mm long, plant very slender.

Leaves deeply pinnatifid, with narrow lobes.

Leaves narrowly linear, entire.

5. *A. Tweedyi*.

Seeds minutely muricate (tubercles seen only under strong magnification), at least the upper leaves broadly ovate

6. *A. tenerrima*.

Petals 5 mm. long, sepals about half as long, lanceolate, acute, plant tall and stout

7. *A. latifolia*.

Petals 3-4 mm long, sepals linear, obtuse, only one-third as long as the petals.

Plant tall, 3-5 dm. high, capsules 2-3 cm. long, lower leaves lanceolate or linear, some of them usually toothed.

8. *A. dispersa*.

Plant low, less than 2 dm. high, capsule 12-15 mm long; leaves all ovate, entire.

9. *A. compacta*.

1. *A. congesta* (Nutt.) Rydb. Stems white, 1-4 dm. high, somewhat pilose, lower leaves linear, entire, 4-6 cm. long; the upper ones lanceolate, sometimes sinuately toothed; sepals 2-3 mm long; petals rounded-obovate; capsule 8 mm long, clavate-oblong, about 20-seeded. Hills: Ida.—Nev.—Calif. *Son.*

2. *A. gracilis* Rydb. Stem 3-5 dm. high; leaves 5-10 cm. long, deeply pinnatifid to near the midrib, floral leaves lanceolate, sessile, pinnatifid or toothed, rarely entire; sepals 4-5 mm. long; petals obovate, 6-7 mm. long, strongly striate; capsule linear-cylindric, 2.5-3 cm. long. Foot-hills and plains: Colo.—Wyo.—Nev.—Wash. *Son.*—*Submont.* My-Jl.

3. *A. ctenophora* Rydb. Stems 3-6 dm. long; lower leaves linear or linear-lanceolate in outline, often 2 dm. long, the upper lanceolate, with a broad base, all pectinately lacinate; sepals ovate-lanceolate, acute, 4-5 mm. long; petals obovate, light yellow, about 8 mm. long. *M. ctenophora* Rydb. Sandy soil: Mont.—Neb.—N.M.—Ariz.—B.C. *Plain*—*Submont.* Mr-Au.

4. *A. albicaulis* (Dougl.) Rydb. Stem white, glabrous, erect, or decumbent at the base, 1-4 dm. high; lower leaves linear-ob lanceolate, usually dentate or entire; middle leaves with 1-5 pairs of linear lobes, the upper linear, usually entire; sepals lanceolate-subulate, 2-2.5 mm. long; petals obovate, 3-4 mm. long, golden yellow, rather prominently veined; capsule linear-cylindric, 10-15 mm. long, 2 mm. thick. *M. albicaulis* Dougl. Sandy soil: Mont.—Neb.—N.M.—Ariz.—B.C. *Plain*—*Submont.* Mr-Au.

5. *A. Tweedyi* Rydb. Stem very slender, erect, 1-3 dm. high, pilose when young; leaves lanceolate or linear in outline, those of the inflorescence almost entire; sepals 1 mm. long; petals oblanceolate, light yellow, 2-3 mm. long; capsule linear-clavate, 15 mm. long. *M. Tweedyi* Rydb. Pine woods: Mont.—B.C. *Plain*—*Submont.* My-Je.

6. *A. tenerrima* Rydb. Stem very slender, ascending, branched, straw-colored, 3-5 dm. high; leaves 2-3 cm. long, pilose; sepals linear-lanceolate, 1 mm. long; petals oblanceolate, lemon-yellow, 2-3 mm. long; capsule 15 mm. long. *M. tenerrima* Rydb. Mountain sides and dry valleys: Mont.—Utah—Ida. *Submont.*—*Mont.* My-Au.

7. *A. latifolia* Rydb. Stem 3-5 dm. high, branched; leaves sessile, ovate or ovate-lanceolate, coarsely toothed or entire, 5-10 cm. long; sepals 2.5-3 mm. long; petals obovate-spatulate, about 5 mm. long; capsule linear-cylindric, 2.5-3 cm. long. Foot-hills and mountains: Colo. *Submont.* Je-Au.

8. *A. dispersa* (S. Wats.) Rydb. Stem erect; lower leaves entire, the middle ones lanceolate, entire or dentate, the uppermost ovate, entire; petals 3-4 mm. long, obovate, bright yellow; capsule 2-3 cm. long. *M. albicaulis integrifolia* S. Wats. *M. dispersa* S. Wats. Sandy soil: Mont.—Colo.—Calif.—B.C.; Mex. Son.—Submont. My—Au.

9. *A. compacta* (A. Nels.) Rydb. Stem whitish, pilose; leaves numerous, 2-3 cm. long, rough-hirsute; petals obovate, 3-4 mm. long; capsule linear-clavate, 10-13 mm. long, 10-12-seeded. *M. compacta* A. Nels. Plains and foot-hills: Wyo.—Colo.—Ida.—Wash. Son.—Submont. Je—Au.

4. MENTZELIA (Plum.) L. STICK-LEAF.

Annual or biennial, or in the tropics even perennial herbs, scabrous, with barbed hairs. Leaves alternate, relatively broad, sinuate or lobed. Flowers perfect, cymose. Sepals 5, persistent. Petals also 5, deciduous. Stamens numerous; filaments filiform, united at the base with each other and with the petals into a ring. Hypanthium short, tapering at the base. Placentae 3, broad and band-like, bearing the ovules in 1 or 2 rows. Capsule 3-valved at the top. Seeds rather few, ellipsoid, angled, striate, neither winged, nor separated by horizontal lamellae.

1. *M. oligosperma* Nutt. Perennial, with a fusiform root; stem straw-colored, rough-hirsute; leaves ovate or ovate-lanceolate, or sometimes rhombic, coarsely dentate and often somewhat lobed, 1-6 cm. long; sepals 5-8 mm. long, linear-subulate; petals 10-15 mm. long, obovate-cuneate, cuspidate, golden yellow; stamens about 20; capsule about 8 mm. long, 2 mm. thick, about 3-seeded. *M. Nelsonii* Greene, a small-flowered form. Rocky places and hill-sides: Ill.—La.—Tex.—N.M.—N.D.; Mex. Plain—Submont. Je—Au.

5. EUCNIDE Zucc.

Annual or biennial herbs. Leaves alternate, broad, toothed or lobed, long-petioled, armed with stinging barbed hairs. Flowers solitary or in cymes. Sepals 5, persistent. Petals 5, deciduous, united at the base. Stamens numerous; filaments united below and adnate to the petals. Styles 5, distinct above. Placentae 5, parietal; ovules numerous. Capsule broadened upwards, 5-valved at the top; seeds numerous, longitudinally striate.

1. *E. urens* Parry. Stem very hispid, with stinging bristles, straw-colored; leaf-blades suborbicular or broadly ovate, 4-5 cm. long, the lower petioled, the upper sessile; sepals lanceolate, 15-20 mm. long; petals obovate, 3-4 cm. long, light yellow, short-acuminate. Sandstone cliffs: s Utah—Nev. L. Son. My.

6. PETALONYX A. Gray.

Erect perennial herbs, shrubby at the base, or low shrubs, scabrous with short barbed hairs. Leaves alternate, entire or toothed. Flowers small, in terminal heads or short spikes. Hypanthium small, cylindric. Sepals 5, linear, deciduous. Petals 5, yellowish, long-clawed, spatulate. Stamens 5; filaments free, filiform. Ovary 1-celled. Style simple. Stigma entire. Ovule solitary, pendulous. Capsule oblong, bursting irregularly. Seed smooth.

Leaves of the branches reduced, less than 1 cm. long.

Leaves of the branches not reduced, about 2 cm. long.

1. *P. Thurberi*.

2. *P. Parryi*.

1. *P. Thurberi* A. Gray. Perennial, more or less shrubby at the base; stems 3-6 dm. high, finely scabrous-pubescent; leaves 6-20 mm. long, ovate or triangular-ovate, thick, finely scabrous, sessile, entire or few-toothed; spikes short, 1-4 cm. long, bracts 2, small, linear; sepals linear, 1 mm. long; petals white, 4-5 mm. long, slender-clawed; blades ovate; fruit ovate, 2.5 mm. long. Dry sandy soil: Ariz.—s Utah—s Calif.; Mex. L. Son. My—Jl.

2. *P. Parryi* A. Gray. A low shrub; bark of the stems gray and fissured, that of the twigs straw-colored and scabrous-puberulent; leaves subsessile, ovate or rhombic, or the lower spatulate, crenate, 1-3 cm. long, very scabrous;

bracts lanceolate, crenate; sepals linear, 3 mm. long, twice as long as the hypanthium; petals yellowish, about 1 cm. long, long-clawed; blades spatulate. Desert region: s Utah. *L. Son.*

FAMILY 88. CACTACEAE. CACTUS FAMILY.

Succulent shrubby plants, usually spiny, the spines arising from small hairy or bristly cushions (areolae); leaves usually wanting, if present, in ours small and deciduous. Flowers perfect, in ours regular, solitary. Hypanthium well developed, enclosing the ovary. Sepals usually many, imbricate, the inner often petal-like. Petals many, in two or more series. Stamens numerous, in several series. Gynoecium of several united carpels; ovary inferior, 1-celled, with several parietal placentae. Fruit a fleshy or rather dry berry.

Leaves evident, but small and deciduous. flowers without definite tube; seeds with a bony aril, stems jointed 1 OPUNTIA.

Leaves wanting, flowers with a more or less definite tube, seeds without aril; stems not conspicuously jointed

Flowers borne near the spine-bearing areolae.

Plant-body more or less cylindric; spines arranged on definite ribs; flowers arising from near fully developed areolae, hence lateral on the stem 2. ECHINOCEREUS.

Plant-body usually globular or ellipsoid or short cylindric, fruit not spiny; stem tubercled or ribbed, if ribbed the flowers arising near young areolae, hence nearly terminal on the stem.

Flowers large, fruit covered with bracts, seeds smooth 3. ECHINOCACTUS.

Flowers small, fruit naked or nearly so, seeds roughened; stems tubercled.

4 PEDIOCACTUS.

Flowers borne remote from the spines, at the base of the tubercles of the stem.

5. CORYPHANTHA.

1. OPUNTIA Hill.* PRICKLY PEAR, CHOLLA, INDIAN FIG, TREE CACTUS.

Fleshy plants with conspicuously jointed stems, the joints flat or terete. Leaves scale-like, caducous, spirally arranged. Areolae axillary, usually spine-bearing. Flowers lateral, arising from the upper part of some spine-bearing areolae. Hypanthium bearing areolae, not produced beyond the ovary. Sepals spreading, in several rows. Style cylindric; stigma 5-8-lobed. Berry more or less pear-shaped, fleshy or rather dry. Seeds disk-like and flattened. Embryo curved around the endosperm.

Internodes cylindrical, spines covered with a delicate sheath.

Internodes very fleshy, turgid, easily detached.

Internodes less fleshy, not easily detached.

Fruit dry; seeds angular.

Fruit fleshy, seeds not angular.

Plants tall (1 to 3 meters high); flowers red.

Plants low and spreading (less than 1 meter high).

Spines yellow; flowers olive-green.

Spines white; flowers yellow.

Internodes flat and broad; spines not covered by a sheath.

Pulvini not densely woolly.

Fruit dry when mature, usually very spiny.

Internodes very fleshy, often terete in section, the terminal one easily breaking loose.

Internodes never terete in section, but always much broader than thick.

Internodes somewhat turgid, spines very long.

Internodes flat, spines medium length.

Petals normally yellow

Spines stout, dark brownish.

Spines weak, white.

Petals red.

Filaments red.

Filaments yellow.

Fruit juicy, usually naked or nearly so.

Internodes pubescent, always spineless.

Internodes glabrous

Internodes often naked or sometimes bearing long, stout spines.

Internodes pale, somewhat glaucous.

Internodes deep green.

1. *O. echinocarpa.*

2. *O. acanthocarpa.*

3. *O. arborescens.*

4. *O. Davisii.*

5. *O. whipplei.*

6. *O. fragilis.*

7. *O. rutila.*

8. *O. polyacantha.*

9. *O. schwerintana.*

10. *O. rhodantha.*

11. *O. xanthostemma.*

12. *O. basilaris.*

13. *O. humifusa.*

14. *O. Greenii.*

* Key prepared by Dr. J. N. Rose.

Internodes generally bearing several spines from each areole.

Spines twisted.

Spines not evidently twisted.

Low and procumbent; internodes 5 to 10 cm. broad.

Stout and somewhat ascending; internodes 12 cm. or more broad.

Pulvini densely long-woolly

Plant erect; one spine deflexed.

Plant prostrate; all spines deflexed.

15. *O. lortispina*.

16. *O. camanchica*.

17. *O. utahensis*.

18. *O. Palmeri*.

19. *O. rubrifolia*.

1. *O. echinocarpa* Engelm. A low shrub, 1.5–4.5 dm. high, with numerous spreading branches; internodes ovate, 2.5–6 cm. long, less than 2.5 cm. thick, with ovate crowded areolae, 8–10 mm long; pulvini with few straw-colored bristles; larger spines about 4, whitish, 18–25 mm. long; smaller ones 8–16, spreading; flowers greenish yellow, 3.5–4 cm. broad; fruit dry, depressed-globose, very spiny. Desert regions: Ariz.—s Utah—Calif. *L. Son.*

2. *O. acanthocarpa* Engelm. Erect and arborescent, 1.5–2 m. high, with few alternate branches, internodes cylindric, 1–2 dm. long, 2.5 cm. thick, areolae oblong, 18–20 mm. long, pulvini with short wool and scanty bristles, spines 8–25, spreading in all directions, the inner 2.5–3 cm. long; flowers copper-colored; fruit depressed-globose, with few stout spines. Desert regions: Ariz.—s Utah—se Calif.—Sonora. *Son.*

3. *O. arborescens* Engelm. Erect, arborescent, 1.5–8 m. high, with verticillate branches; internodes cylindric, 0.5–1.5 dm. long, 2 cm. thick, areolae oblong, 15–30 mm. long; pulvini short-woolly, but scarcely bristly; spines 8–30, terete, spreading, the inner often 2.5 cm. long; flowers purple, 6–7.5 cm. broad, fruit subglobose, prominently tuberculate, unarmed. TREE CACTUS. Foot-hills and plains: Tex.—Colo.—Utah—Sonora. *Son.—Submont.*

4. *O. Davisii* Engelm. Spreading or procumbent, with divaricate branches; internodes slender, narrowed towards the base, 10–15 cm. long, with linear-oblong areolae, 14–16 mm. long; inner spines 4–7, subtriangular, reddish brown, 2.5–3.5 cm. long, the lower 5 or 6 slender, 6–12 mm. long; flowers yellowish; fruit ovoid, 2.5 cm. long, spiny. Arid regions: Tex.—s Colo.—s Calif. *Son.*

5. *O. Whipplei* Engelm. Stem erect, rarely spreading, 2–20 dm. high, with divaricate branches; internodes cylindric, 5–30 cm. long, 1–2 cm. thick, with ovate areolae, 10 mm. long; pulvini sparingly woolly, scarcely bristly; spines short, the longer 1–4 divaricate, 6–18 mm. long, and 2–8 smaller ones deflexed; flowers red; fruit subglobose, lightly tuberculate, unarmed. Desert regions: N.M.—s Utah—Calif.—L. Calif. *L. Son.*

6. *O. fragilis* (Nutt.) Haw. Decumbent; internodes 3.5–5 cm. long, ovate, only slightly compressed or subterete; pulvini large, white woolly and with few bristles; spines 1–4, divaricate, the uppermost stout, angular, 12–20 mm. long; flowers pale yellow, about 5 cm. broad; fruit ovate, almost naked, about 2.5 cm. long. Plains and hills: B.C.—Minn.—Wis.—Kans.—Utah. *Plain—Submont.*

7. *O. rutila* Nutt. Stems ascending or diffuse; internodes thick, ovate, 5–10 cm. long, 2.5–7.5 cm. broad; pulvini crowded, white-woolly and bristly; spines 3–5, reddish gray, 1–4 cm. long, the central one longer, spreading or declined, the upper erect, the rest reflexed; flowers rose-red or pink; fruit ovate, dry, spinulose, 2.5–3 cm. long. Plains: w Wyo.—Calif.—Ariz. *Son.—Submont.*

8. *O. polyacantha* Haw. Stem prostrate; internodes broadly obovate or orbicular, pale green, 5–15 cm. long, about 12 mm. thick; pulvini densely bristly; spines 5–15, rather stout, 1–5 cm. long, variegated, the 3–5 inner stout, reddish brown, 3–5 cm. long, some deflexed, some spreading; flowers yellow; fruit ovoid, spiny, 2.5 cm. long. *O. missouriensis* DC. Plains and prairies: Sask.—Wis.—Mo.—N.M.—Utah—B.C. *Plain.* My-Je.

9. *O. Schweriniana* K. Schum. Diffuse; internodes oblong, small, only 5 cm. long and 3.5 cm. wide; pulvini with brown bristles; spines 7–10, only on the lower side of the pulvini, the larger only about 1 cm. long, at last all reflexed; flowers 4 cm. broad, yellow or greenish yellow; filaments green or yellow; fruit ovoid. Hillsides: Colo. *Submont.*

10. *O. rhodantha* K. Schum. Stem erect; internodes obovate or more oblong, 7-12 cm. long, 5-10 cm. wide; pulvini with reddish brown bristles; spines 2-4, soon becoming gray, up to 3 cm. long, the larger flattened, porrect or erect, the lower deflexed; flowers carmine; style rose-red; stigma green; fruit obovate, bristly, soon unarmed. Table-lands: Colo.—w Neb.—Wyo. *Submont. Je.*

11. *O. xanthostemma* K. Schum. Stem erect, 3 dm. high; internodes obovate, bright green; pulvini woolly at first, with reddish brown bristles; lower ones spineless, the upper with 2-4 large spines, which are terete, 4 cm. long, the upper dark brown, porrect, the lower reflexed, and 2-4 dark smaller ones; flowers 5 cm. broad, carmine-red; style white at the base; stigma green; fruit obovoid, prickly. Table-lands: Colo. *Submont. Je.*

12. *O. basilaris* Engelm. Ascending; internodes obovate, glaucescent, minutely pubescent, 1-2 dm. long; pulvini depressed, with yellow wool and numerous reddish brown bristles, without proper spines; flowers purple, 6 cm. broad; fruit short-obovate, pubescent. Desert regions: Ariz.—Utah—Nev.—se Calif.—Sonora. *Son.*

13. *O. humifusa* Raf. Stem diffuse; internodes obovate or suborbicular, 7.5-12 cm. long; pulvini with slender reddish brown bristles, mostly unarmed; spines when present few, only marginal, stout, straight, white, usually reddish at the base and apex, the longest 1.5-2.5 cm. long; flowers sulphur-yellow, 6-8.5 cm. broad; fruit clavate, naked, 3.5-5 cm. long, with purplish pulp. *O. Rafinesquii* Engelm. Sandy soil: Tex.—Colo.—Minn. *Plain.*

14. *O. Greenei* Engelm. Stem diffuse; internodes orbicular-obovate; pulvini with numerous reddish brown bristles, unarmed, or armed with 1-3 spines, the upper one stout, terete, 2.5-3.5 cm. long, brownish red, at least at the base; fruit ovate, 3 cm. long, unarmed. Dry plains: Colo.—Ariz. *Son.—Submont.*

15. *O. tortispina* Engelm. Stem prostrate; internodes orbicular-obovate, 1.5-2 dm. long; pulvini with yellowish bristles, armed with 3-5 yellowish, angled, usually twisted spines, the longer ones 3-6 cm. long, with 2-4 slender ones below; flowers sulphur-yellow, 6-7.5 cm. broad; fruit ovate, 4.5-5 cm. long. Plains: Miss.—Neb.—Tex.—Colo. *Plain—Son.*

16. *O. camanchica* Engelm. Stem prostrate; internodes obovate-orbicular; pulvini with few greenish or yellowish brown bristles, armed with 1-3 (or the marginal ones 3-6) spines, which are reddish brown or blackish brown, with paler tips, 3.5-7.5 cm. long, the upper erect, the rest deflexed; fruit oval, 3.5-5 cm. long, deep red, sweet. Plains and hillsides: Tex.—Colo.—Ariz. *Plain—Submont.*

17. *O. utahensis* Purpus. Stem prostrate; internodes elliptic or obovate, dark green; pulvini with yellowish white wool and yellowish bristles; spines 1-4, the longest 4 cm. long; flowers up to 9 cm. broad, carmine; fruit cylindric, 4 cm. long and 2 cm. thick. Mountains: Utah. *Submont.*

18. *O. Palmeri* Engelm. Stem erect; internodes oval, not tuberculate, pale, glaucous, 20-25 cm. long, 15-20 cm. broad; pulvini with pale brownish or gray persistent wool, and few straw-colored bristles; spines 5-7 larger ones and a few smaller ones on the upper pulvini, 1-3 on the lower ones, 2.5-3 cm. long, erect or spreading or the upper ones deflexed. Arid regions: s Utah. *L. Son. Je.*

19. *O. rubrifolia* Engelm. Prostrate; internodes ovate, 12-15 cm. long and 10 cm. broad; pulvini with brownish gray persistent wool and numerous yellowish bristles; spines mostly 2 or 3, slender, angular and often twisted, 2.5-6 cm. long, all deflexed. Arid regions: s Utah. *L. Son.*

2. ECHINOCEREUS Engelm. HEDGEHOG CEREUS.

Plants with cylindric or rarely oblong stems, ribbed, or if tubercled, the tubercles more or less connected in vertical rows. Leaves none. Spine-bearing

areolae on the ribs or the tubercles. Flowers arising close above the spine-bearing, fully developed areolae, hence appearing lateral on the stem. Hypanthium prolonged beyond the ovary, scaly. Style filiform. Fruit fleshy. Seeds tubercled, endosperm scanty; embryo straight.

- Corolla greenish; ribs of the stem about 13
 Corolla red or purple, ribs usually less than 13.
 Ribs of the stem 8-12.
 Flowers scarlet; central spines 2-7
 Central spines all terete, flowers 4-6 cm. long, yellowish inside
 Lower central spine quadrangular, flowers 8-10 cm. long
 Flowers purple or violet.
 Central spines 4-5, straight
 Central spines solitary, bulbous at the base
 Central spine terete, radials 12-25 mm long, the lower stouter
 Central spine angular, radials 2-5 cm long, the lateral ones strongest
 Ribs of the stem 5-7
 Central spine present, 8 cm. long, angled and grooved; radials 6-8, strongly angled
 Central spine wanting; radials 3-59, almost terete.
- 1 *E. viridiflorus*.
 2 *E. aggregatus*
 3 *E. Roemerii*.
 4. *E. Engelmanni*.
 5 *E. Fendleri*.
 6 *E. mojavensis*
 7. *E. goniacanthus*.
 8 *E. paucispinus*

1. *E. viridiflorus* Engelm. Stem globose or sometimes oblong-cylindric, 2.5-7.5 cm. high; ribs 13, acute; central spines solitary, stout, straight or curved, 12-14 mm. long, variegated with purple and white; radial spines 12-18, strict and radiating, 2-6 mm long; flowers 2.5 cm. wide, greenish brown without, yellowish green within; fruit elliptic, 10-12 mm long. Plains and hills: Tex.—Wyo.—N.M. *Son.*—*Submont.*

2. *E. aggregatus* (Engelm.) Rydb. Ovate or subglobose, obtuse, 3.5-7.5 cm. high, 3-5 cm. thick, cespitose in hemispheric tufts; ribs 8-11, tubercled; spine slender, straight, terete; radials 8-12, white, 6-12 mm. long, the upper shorter; central spines 1-3, stouter, 1-2 cm. long; flowers deep scarlet, 3.5-6 cm long, 2.5-3.5 cm. broad. *Cereus coccineus* and *C. phoeniceus* Engelm. Hillsides and plains: Tex.—Colo.—Ariz.; n Mex. *Son.*—*Submont.*

3. *E. Roemerii* (Muhlenph.) Engelm. Stem ovoid, 7.5-10 cm. high, sparingly branched; ribs 9-11, obtuse, tubercled; spines whitish or straw-colored, with bulbous bases; radials 8-12, slender, straight, the upper 4-10 mm. long, the lateral 12-30 mm. long; central spines 3-5, very bulbous, the lowest quadrangular, dusky when young, 2.5-7.5 cm. long, porrect or reflexed; flowers scarlet, 8-10 cm. long, 3.5-5 cm. broad. *Cereus Roemerii* Muhlenph. *C. comoides* Engelm. Plains: N.M.—Colo.—Calif.; n Mex. *Son.*

4. *E. Engelmanni* (Parry) Lem. Stem elliptic-cylindric, 12-30 cm. high, 5-7 cm. thick, simple or sparingly branched; ribs 10-12, rarely 13, tuberculate; radial spines 12-14, slender, 6-12 mm. long, white, with dark tips, the upper setaceous and the lower stoutest; central spines 4 (or 5), straight and angled, 2.5-5 cm. long, the 3 upper yellow, straight, the lowest white, porrect or reflexed; flower purple, 5-7 cm. long; fruit ovate, 4 × 2.5 cm. *Cereus Engelmanni* Parry. Deserts: Utah—Calif.—L. Calif.—Sonora. *L. Son.*

5. *E. Fendleri* (Engelm.) Ruml. Stem ovoid or ovoid-cylindric, 7.5-20 cm. high, 5-7.5 cm. in diameter, cespitose; ribs 9-12, tuberculate; radial spines 5-10, straight or curved, the lowest stoutest, white and angular, 12-25 mm. long; central spine 1, stout and bulbous at the base, curved upwards, reddish black, 2.5-5 cm. long; flowers violet-purple, 6-8.5 cm. broad; fruit ovate-globose, 2.5-3 cm. long, purple-green, edible. *Cereus Fendleri* Engelm. Dry plains: Tex.—Utah—Ariz.; n Mex. *Son.*

6. *E. mojavensis* (Bigel. & Engelm.) Ruml. Stem ovate, glaucous, 5-8 cm. high, densely tufted, forming masses 1 m. wide; ribs 8-12, slightly tubercled; central spine angular, dusky, curved upwards, 3.5-6 cm. long; radials 5-8, stout, curved, and interlocked, white or with tawny tips, the upper and lower 2-3 cm. long, the lateral ones 3-5 cm. long; flowers deep crimson, 5-7 cm. long; fruit oblong, 2.5-3 cm. long. Deserts: Calif.—Utah—Ariz. *Son.*

1. **E. commutata** Bernh. Shrub or small tree, 2-5 m. high, with brown-scurfy twigs; leaf-blades oblong or elliptic, densely silvery, scurfy on both sides, 2-10 cm. long; flowers 1-3 in the axils, fragrant, 12-16 mm. long; perianth silvery without, yellowish within; sepals ovate, 2 mm. long; fruit ellipsoid, silvery, 8-12 mm. long; stone 8-striate. *E. argentea* Pursh. Banks and hillsides: Que.—Minn.—S.D.—Utah—Yukon. *Plain*—*Submont.* Je-Jl.

2. **LEPARGYRAEA** Raf. BUFFALO-BERRY, BULL-BERRY.

Shrubs, with silvery or brown, scaly or stellate pubescent. Leaves opposite, petioled. Flowers small, dioecious, in small clusters at the nodes of preceding season. Hypanthium of the pistillate flowers urn-shaped or ovoid, bearing an 8-lobed disk at its mouth. Stamens 8, alternate with the lobes of the disk. Fruit drupe-like. [*Shepherdia* Nutt.]

Leaves green above; shrub not thorny.

Leaves silvery white on both sides, plant usually thorny

Leaves oblong; fruit ellipsoid, tall shrub or small tree.

Leaves rounded-oval or ovate; fruit globular; low shrub.

1. *L. canadensis*.

2. *L. argentea*.

3. *L. rotundifolia*

1. **L. canadensis** (L.) Greene. A thornless shrub, 1-3 m. high, with brown scurfy branches; leaves ovate or oval, silvery stellate and brown-scurfy spotted beneath; flowers brown without, greenish yellow within; fruit rounded-ellipsoid, red or yellowish, 4-6 mm. long, insipid. *Shepherdia canadensis* (L.) Nutt. Woods and banks: Newf.—N.Y.—Mich.—Colo.—Utah—Ore.—Alaska. *Submont.*—*Subalp.* Ap-Je.

2. **L. argentea** (Nutt.) Greene. A shrub or small tree, 2-7 m. high, with whitish, more or less thorny branches; leaves oblong, 2-5 cm. long, rounded at the apex, acute at the base; flowers brown; fruit rounded-ellipsoid, sour, scarlet, red, or golden yellow, 4-6 mm. long. *S. argentea* Nutt. River banks: Sask.—Man.—Kans.—N.M.—Nev.—Alta. *Plain*—*Submont.* Ap-My.

3. **L. rotundifolia** (Parry) Greene. Low densely branched shrub, with silvery tomentose branches; leaves persistent, rounded-oval or ovate, 1-3 cm. long; staminate flowers in 3's, the pistillate solitary, silvery without; fruit globular, scurfy. *S. rotundifolia* Parry. Bare clayey soil: s Utah. *Son.* Mr.

FAMILY 90. **LYTHRACEAE**. LOOSESTRIFE FAMILY.

Herbs, rarely shrubs or trees, with opposite or alternate, mostly entire leaves. Flowers perfect, solitary or in axillary clusters or cymes. Hypanthium from globose or campanulate to cylindric, enclosing but free from the ovary. Sepals 4 or 5, often accompanied by as many accessory teeth. Petals 4 or 5, or wanting. Stamens few or many, in one or several series. Gynoecium of several united carpels; ovary 2-6-celled, rarely 1-celled; styles united. Fruit a capsule, rarely indehiscent.

Hypanthium campanulate or turbinate, in fruit becoming globose or hemispheric.

Capsule bursting irregularly.

Capsule septical.

Hypanthium cylindric.

1. **AMMANIA**.

2. **ROTALA**.

3. **LYTHRUM**.

1. **AMMANIA** (Houston) L.

Annual herbs, with 4-angled stems. Leaves opposite, entire, usually auricled at the base. Flowers solitary or cymosely clustered in the axils. Hypanthium campanulate, 4-angled, becoming subglobular. Sepals 4, usually with as many small teeth in the sinuses between them. Petals 4, early deciduous. Stamens 4-8. Ovary subglobose, usually 2-4-celled; styles filiform; stigmas capitate. Capsule membranous, bursting irregularly. Seeds angular, with coriaceous coat.

1. **A. coccinea** Rottb. Annual; stem erect, glabrous, branched below, 1.5-5 dm. high, glabrous; leaves linear or linear-lanceolate, acutish at the apex, auriculate at the base, entire, 3-7 cm. long; flowers 1-5 in each axil, sessile or nearly so; petals purple, early deciduous; style elongate, very slender, usually more

than half as long as the capsule. *A. latifolia* T. & G., not L. (?) *A. alkalina* Blankinship. Swamps and wet places: Ind.—Fla.—Tex.—Wyo.—Mont.; Mex.; Brazil. *Plain.* J1-S.

2. ROTĀLA L.

Annual or biennial swamp herbs, with 4-angled stems. Leaves opposite, narrow, entire. Flowers perfect, usually solitary in the axils. Hypanthium campanulate, becoming subglobose in fruit. Sepals 4, very small. Petals usually 4. Stamens 4; filaments short. Ovary subglobose, 4-celled; styles very short; stigma entire or nearly so. Capsule 4-celled, subglobose, septically 4-valved.

1. *R. ramosior* (L.) Koehne. A glabrous annual, 5-25 cm. high; leaves oblong or linear-oblong, 1-3 cm. long, obtuse, acute at the base; flowers usually solitary in the axils; calyx 3-4 mm. long; lobes acuminate; petals minute; capsule ellipsoid. Wet places: Mass.—Fla.—Tex.—Neb.—Calif.—Ida.—Wash.; W. Ind. and Mex. J1-S.

3. LŶTHRUM L. LOOSESTRIFE.

Herbs or shrubs, with angled stem; ours perennial herbs. Flowers solitary in the axils, or in spikes or racemes. Hypanthium cylindric, ribbed or grooved. Sepals 4-6, accompanied with as many accessory teeth. Petals 4-6, obovate or oblanceolate. Stamens 8-12, in one series; filament filiform. Ovary 2-celled; stigma capitate. Capsule membranous, 2-celled, or becoming 1-celled, septically 2-valved or bursting irregularly.

1. *L. alatum* Pursh. Perennial; stem glabrous, 3-12 dm. high, 4-angled or -winged; leaves sessile, alternate or the lowest opposite, lanceolate or oblong, rounded at the base, acute at the apex, 2-3 cm. long, flowers solitary in the upper axils; petals deep purple, ascending; disk fleshy; calyx 5-6 mm. long in fruit, ribbed. Low ground: Ont.—Mass.—D.C.—Tex.—Wyo.—B.C. *Plain.* Je-Au.

FAMILY 91. ONAGRACEAE. EVENING-PRIMROSE FAMILY.

Herbs, or rarely shrubs, with simple alternate or opposite leaves. Flowers perfect, axillary or in terminal racemes. Hypanthium often elongate, enclosing and adnate to the ovary. Sepals 2-6, usually 4. Petals 2-9, usually 4, convolute in the bud, rarely wanting. Stamens as many or twice as many as the sepals. Gynoecium of 1-6, usually 4, united carpels. Ovary 1-6-celled, inferior; styles united. Fruit capsular or nut-like.

Flowers 4-merous

Fruit a many-seeded capsule, opening by valves.

Seeds with a tuft of silky hairs.

Hypanthium not prolonged beyond the ovary; flowers large.

1. CHAMAENERION.

Hypanthium somewhat prolonged beyond the ovary.

Hypanthium-tube cylindric, not inflated above the ovary, without scales within; flowers neither showy nor scarlet.

Flowers regular; stamens and style not declined; petals purplish, pink or white, in ours yellow only in one species.

2. EPILOBIUM.

Flowers irregular, stamens and style somewhat declined, petals yellowish.

3. CORDYLOPHORUM.

Hypanthium-tube inflated above the ovary, bearing 8 scales within; flowers irregular, showy scarlet.

4. ZAUSCHNERIA.

Seeds without a tuft of silky hairs, naked or tuberculate

Hypanthium not produced beyond the ovary, flowers minute.

Stamens 8; sepals deciduous; capsule linear.

5. GAYOPTHYTUM.

Stamens 4; sepals persistent; capsule obovoid or turbinate.

6. ISNARDIA.

Hypanthium prolonged beyond the ovary into a cylindric or funnelform tube.

Antlers attached near the base, erect; petals never yellow.

Calyx-lobes erect; petals minute, clawless; capsule membranous.

7. BOISDUVALLIA.

Calyx-lobes reflexed; petals showy, clawed; capsule coriaceous.

Fertile stamens 4, the alternate ones rudimentary; petals 3-lobed.

8. CLARKIA.

- Fertile stamens 8; petals entire, rhombic
 Anthers attached near the middle and versatile
 Stigma divided into 4 linear lobes
 Stamens equal in length; capsule terete or round-angled
 Ovules and seeds horizontal, inserted in 2 or rarely more rows,
 prismatic-angled, petals yellow 10. OENOTHERA
 Ovules and seeds ascending, in one row, not angled, buds droop-
 ing; petals white or pink. 11. ANOGRRA.
 Stamens unequal in length, the alternate longer; capsule crested or
 winged, plant acaulescent or low-stemmed.
 Capsules with more or less distinct double crests on the angles;
 seed furrowed along the raphe. 12. PACHYLOPHUS
 Capsules winged or at least sharply angled on the angles.
 Plants acaulescent, caespitose 13. LAVAUXIA.
 Plants caulescent, with wiry diffuse stems 14. GAURELLA.
 Stigma discoid or capitate.
 Stigma discoid, hypanthium-tube funnelliform above
 Hypanthium-tube longer than the ovary; stigma entire
 15. GALPINSIA.
 Hypanthium-tube shorter than the ovary; stigma 4-toothed
 16. MERIOLIX.
 Stigma capitate
 Plant acaulescent; capsules 4-winged, hypanthium-tube tubular-
 cylindric 17. TARAXIA
 Plant caulescent; capsules not winged; hypanthium-tube ob-
 conic or funnelliform.
 Capsule linear, sessile, narrowed above.
 18. SPHAEROSTIGMA.
 Capsule more or less clavate, pedicelled and obtuse
 19. CHYLISMIA.
 Fruit indehiscent, nut-like
 Hypanthium-tube filiform; filaments unappendaged; ovary 1-celled
 20. STENOSIPHON
 Hypanthium-tube obconic, filaments with scales at the base; ovary 4-celled
 21. GAURA
 Flowers 2-merous; fruit indehiscent, obovoid and bristly with hooked hairs
 22. CIRCAEA

1. CHAMAENERION (Gesn.) Boehmer-Ludwig. FIRE-WEED.

Perennial herbs, somewhat woody at the base. Leaves alternate, narrow, entire. Flowers perfect, somewhat irregular, showy, in terminal racemes. Hypanthium not prolonged beyond the ovary. Sepals 4, deiduous. Petals 4, purple, forming an oblique cross, entire. Stamens 8, with declined filaments. Stigma 4-lobed. Capsule elongate, nearly linear, obtusely 4-angled, locu-
 leidal. Seeds with a tuft of hairs (coma) at the upper end.

Style pubescent at the base, leaves lanceolate or linear-lanceolate, with the lateral veins
 confluent in marginal loops

Petals 15-20 mm. long; stem-leaves usually obtuse at the base 1 *C. exaltatum*.

Petals 8-12 mm (rarely 15 mm) long, leaves all acute at the base 2 *C. spicatum*

Style glabrous, lateral veins of the leaves obsolete, not looped

Leaves lanceolate to ovate, entire or nearly so, pod about 3 mm thick

3 *C. latifolium*

Leaves narrowly linear-lanceolate, denticulate, pod about 2 mm thick 4 *C. subdentatum*.

1. *C. exaltatum* Rydb. Stem 1-3 m. high, glabrous or nearly so; leaves linear-lanceolate, 1-2 dm. long, 2-3 cm. wide, short-petioled, minutely denticu-
 late or entire, slightly paler beneath; lateral veins numerous, at almost right
 angles to the midrib; petals purple, broadly obovate; styles exceeding the stam-
 ens, bearded some distance above the base; capsule 5-8 cm. long, spreading
 Hillsides: Alaska—Mont.—Ida.—Wash. Submont. Je-Jl.

2. *C. spicatum* (Lam.) S. F. Gray. Stem 0.5-2.5 m. high, glabrate below,
 puberulent above; leaves lanceolate or linear-lanceolate, 5-15 cm. long, paler
 beneath; petals purple, rose-colored or rarely white; style exceeding the stamens,
 hairy at the base; capsule 5-7.5 cm. long. *Epilobium angustifolium* β L. *C.*
angustifolium Scop. Edges of woods and coepes, burnt-over ground, etc.: Greenl.
 —N.C.—Ill.—N.M.—Calif.—Alaska. Submont.—Mont. Je-S.

3. *C. latifolium* (L.) Sweet. Perennial, with a caespitose rootstock; stem
 1-4 dm. high, glabrous below; leaves 2-5 cm. long, ovate or ovate-lanceolate,
 pale; inflorescence usually short; petals 1.5-3 cm. long, rose-colored, pale purple,

or white, purple-veined; style shorter than the stamens, glabrous; capsule 5-8 cm. long. *Epilobium latifolium* L. Wet places, especially along mountain streams: Greenl.—Que.—S.D.—Colo.—Wash.—Alaska. *Subalp.*—*Alp.* Je-Au.

4. *C. subdentatum* Rydb. Stem 2-3 dm. high, finely puberulent; leaves narrowly lance-linear, more or less distinctly denticulate, 2-4 cm. long, 3-8 mm. wide, finely puberulent, the midvein strong, but the lateral ones obscure; sepals lance-linear, 12 mm. long, purplish; petals oblanceolate, about 15 mm. long, rose or white; style shorter than the stamens, glabrous; capsule 3-6 cm. long, 2 mm. thick. Banks: Alta.—B.C. *Subalp.*

2. *EPILOBIUM* (Gesn.) L. WILLOW-HERB, COTTON-WEED.

Caulescent herbs, rarely shrubby. Leaves alternate or opposite, with often toothed blades. Flowers perfect, racemose or spicate, or rarely solitary. Hypanthium prolonged beyond the ovary into an obconic short tube. Sepals and petals 4, the latter often notched, purplish, pink or white, rarely yellow. Stamens 8, not declined. Stigma club-shaped, subentire, slightly notched, or rarely 4-lobed. Capsule elongate, subcylindric, slightly fusiform or clavate, 4-celled, 4-sided, loculicidal. Seeds with a tuft of hairs (coma) at the upper end.

Petals purple, pink or white.

Perennials, stigma entire or merely notched.

Leaves oblong, oval, ovate, or lanceolate, usually dentate or denticulate.

Plants with rosettes or turions, leaves ovate or lanceolate, usually broadest below the middle, and distinctly denticulate or dentate (except sometimes in nos 8, 9, and 16).

Stem pubescent throughout, leaves also pubescent, at least when young.

Pubescence consisting of long silky hairs.

Pubescence short and dense, crisp or glandular.

Petals 7-8 mm. long.

Petals 4-5 mm. long.

Leaves ovate, permanently glandular, dark green.

Leaves lanceolate, glabrous in age, pale green.

Stem glabrous below; leaves glabrous or nearly so.

Flowers 7-8 mm. long; petals purple or dark pink; leaves ovate-lanceolate.

Leaves sessile or nearly so, innovations by turions.

Seeds without apiculations; coma sessile.

Plant tall, 5-10 dm. high, leaves dark green, sharply dentate.

Plant low, 2-4 dm. high, leaves light green, more indistinctly denticulate.

Seeds with a pale hyaline beak at the apex.

Leaves short-petioled; innovations by rosettes.

Flowers 3-5 mm. long.

Leaves all except the uppermost, short-petioled.

Seeds pellucid-apiculate, leaves not very thin; pods strongly ascending or nearly erect.

Innovations by rosettes.

Leaves narrowly lanceolate, pale green, corolla white.

Leaves broadly lanceolate, not pale; corolla usually pink.

Innovations by turions.

Seeds not apiculate, leaves very thin; pods ascending-spreading.

Leaves all sessile or only the very earliest sometimes short-petioled.

Leaf-blades rounded at the base, broadly lanceolate to ovate.

Petals purple, 5-8 mm. long, leaf-blades usually ovate.

Petals white, 4 mm. long; leaf-blades lanceolate.

Leaf-blades acute at the base.

Petals white or rarely pale pink.

Leaf-blades ample, ovate or broadly lanceolate.

Plant tall, 3-6 dm. high; pod and inflorescence more or less glandular.

Plant 1-2 dm. high, whole plant perfectly glabrous, except the slightly crisp-hairy decurrent lines.

Leaf-blades narrowly lanceolate, almost erect, plant slender.

1-3 dm. high.

cm. long; sepals and petals about 1 mm. long; capsules erect, flat, glabrous or nearly so, 6-12 mm. long. Low sandy soil: Wash.—Ida.—Utah—Calif. *Mont.* Je—Au.

6. *ISNÁRDIA* L. MARSH PURSLANE.

Succulent caulescent herbs, with creeping or floating stems. Leaves few, petioled, opposite. Flowers perfect, axillary, sessile. Hypanthium not produced beyond the ovary. Sepals 4, erect and persistent. Petals 4, small, reddish, or wanting. Stamens 4, with short filaments. Capsule short, truncate at the apex, mostly obpyramidal or obovoid. Seeds without a coma.

1. *I. palustris* L. Stem branching, 1-5 dm. long; leaf-blades oval, ovate, or spatulate, 1-2.5 cm. long, slender-petioled; flowers solitary; bractlets none; sepals triangular, acute; capsule 4-sided, slightly longer than broad, 3-4 mm. long. Muddy places and shallow water: N.S.—Fla.—Calif.—Ore.; Mex. and the Old World.

7. *BOISDUVÁLLIA* Spach.

Erect caulescent annuals. Leaves alternate, simple, sessile. Flowers in leafy spikes. Hypanthium produced above the ovary into a funnelform deciduous tube. Sepals 4, erect. Petals 4, sessile, 2-lobed, purple or white. Stamens 8, those opposite the petals shorter; anthers all perfect, oblong, attached near the base. Styles filiform; stigma with 4 cuncate lobes. Capsule oblong, membranous, 4-celled, 4-valved to the base. Seeds without a coma, smooth.

Capsule loculicidal, a considerable portion of the septa remaining attached to the valves at dehiscence, leaves mostly alike

Leaves ovate or ovate-lanceolate, dentate, glabrous or nearly so 1. *B. glabella*

Leaves narrowly lanceolate, entire or remotely denticulate, softly pubescent.

2. *B. parviflora*

Capsule septicidal; septa adherent to the placenta, rendering the latter 4-winged; upper floral leaves broader. 3. *B. salicina*.

1. *B. glabella* (Nutt.) Walp. Stem 1-3 dm. high, simple, or branched near the base, glabrous or nearly so; leaves and bracts 1-2 cm. long, acute, serrulate; corolla about 2 mm. long, violet; capsule slender, nearly straight, about 7 mm. long, 4-ribbed, seeds sub-fusiform, about 1 mm. long. Damp ground: Sask.—Nev.—Calif.—B.C. *Plain—Submont.* Je—Jl.

2. *B. parviflora* Heller. Stem 1-3 dm. high, branched below, pubescent with spreading white hairs; leaves 1-2.5 cm. long; petals red, about 3 mm. long; capsule about 7 mm. long, slightly curved; seeds somewhat flattened. Sandy soil: Wash.—Ida.—Ore. *Submont.* My—Au.

3. *B. salicina* (Nutt.) Rydb. Stem simple, 2-5 dm. high, grayish strigose; leaves linear or linear-lanceolate, 2-3 cm. long, canescent, entire-margined or nearly so; bracts ovate-lanceolate or ovate, 1-2 cm. long; corolla 4-5 mm. long, purple or rarely white; capsule about 1 cm. long, slightly 4-angled; seeds concave on the inner face. *Oenothera densiflora* β T. & G. *O. salicina* Nutt. Low ground: B.C.—Ida.—Ore. *Plain—Submont.* Jl—S.

8. *CLÁRKIA* Pursh. CLARKIA, PINK FAIRIES.

Annual caulescent, brittle herbs. Leaves alternate, narrow. Flowers showy, in terminal racemes, perfect. Hypanthium produced beyond the ovary into an obconic tube, which is deciduous. Sepals 4, reflexed. Petals 4, clawed, 3-cleft, purple. Perfect stamens 4, with a linear scale at the base on each side; the alternate ones rudimentary, filiform; perfect anthers oblong. Stigmas with 4 broad lobes. Capsule elongate, 4-angled, 4-celled, and 4-valved to the middle. Seeds angled or margined, without a coma.

1. *C. pulchella* Pursh. Stem 2-6 dm. high, puberulent; leaves linear-lanceolate to linear, 3-7 cm. long, entire, glabrous or nearly so; calyx 1-1.5 cm. long; petals purple, 12-25 mm. long, with long slender claws and 3-cleft limb; capsule linear, 16-24 mm. long, 8-angled. Dry plains and hillsides: B.C.—Alta.—Mont.—Ore. *Son.—Submont.* Je—Jl.

9. PHAEOSTOMA Spach.

Annual caulescent herbs. Leaves alternate, narrow. Flowers in terminal racemes. Hypanthium-tube above the ovary obconic. Sepals 4, reflexed. Petals 4, rhomboidal, with a broad short blade, entire, purple. Stamens 8, all perfect, with hairy scales at the bases. Stigma with broad lobes. Capsule elongate, somewhat fusiform, 4-angled, 4-celled, 4-valved to the middle. Seeds without a coma, obliquely prismatic.

1. *P. rhomboidea* (Dougl.) A. Nels. Stem puberulent or glabrous, 3-6 dm. high; leaves petioled; blades oblong-lanceolate or oblong-ovate, 3-5 cm. long, petals purple, 5-7 mm. long, short-clawed, the claw often with a tooth on each side; blades rhombic, entire; capsule 15-25 mm. long, 4-angled, nearly glabrous. *Clarkia rhomboidea* Dougl. *Ospanthes gauroides* (Don.) Lilja. Sandy soil and hillsides: B.C.—Mont.—Utah—Calif. *Submont.* Ap-Jl.

10. OENOTHERA L. EVENING-PRIMROSE.

Biennial or annual stout herbs, with taproots. Leaves alternate, undulate or toothed. Flowers in terminal spikes, nocturnal, from erect buds. Hypanthium-tube above the ovary funnelform. Sepals 4, reflexed. Petals 4, usually orbiculate, yellow, or in age turning purplish. Stigmas with 4 linear lobes. Stamens 8. Capsule usually tapering upwards, 4-celled, loculicidal, 4-valved. Seeds in two or more rows, horizontal. [*Onagra* Adans.]

Free tube of the hypanthium 1.5-4 cm. long.

Petals turning pink or purplish in age, 3-4 cm. long

Free tips of the sepals about 4 mm. long, pubescence of the leaves short, that of the calyx not very copious. 1 *O. Hookeri*

Free tips of the sepals 2-2.5 mm. long, pubescence of the leaves long and loose, that of the calyx copious. 2 *O. hirsutissima*.

Petals not turning pink or purplish in age, less than 3 cm. long.

Free tips of the sepals 3 mm. long or longer

Spiko not conspicuously leafy-bracted; bracts lance-linear, none except the very lowest ones exceeding the hypanthium-tube or the fruit in length. 3 *O. subulifera*.

Spiko conspicuously leafy-bracted, bracts, even the upper ones, exceeding the hypanthium-tube or the fruit in length

Bracts caudate-acuminate, with twisted tips, plant canescent; corolla about 15 mm. long 4 *O. Cockerellii*.

Bracts not caudate-acuminate

Petals 10-12 mm. long, plant green

Petals 20-30 mm. long, plant canescent

Free tips of the sepals about 2 mm. long

Stem erect; petals 12-20 mm. long

Stem decumbent, petals about 10 mm. long

Free tube of the hypanthium 8-15 cm. long

Leaves linear, entire.

Leaves ovate or lanceolate, sinuate-dentate.

5. *O. muricata*.

6. *O. ornata*.

7. *O. strigosa*.

8. *O. depressa*.

9. *O. longissima*.

10. *O. Jamesii*.

1. *O. Hookeri* T. & G. Biennial, with a taproot, stem 5-10 dm. high, erect, angled, more or less hirsute and canescent; leaves lanceolate, repand-dentate, hirsute and canescent, 5-20 cm. long, free tube of the hypanthium 3.5-4 cm. long; sepals about 3 cm. long, more or less hirsute; petals 3-4 cm. long; capsules 4-5 cm. long, hirsute and more or less canescent. *Onagra Macbridei* A. Nels. Valleys: Mont.—N.M.—Calif.—B.C.; n Mex. *Submont.*—Mont. Je-S.

2. *O. hirsutissima* (A. Gray) Rydb. Biennial, with a taproot; stem 3-6 dm. high, grayish pubescent, as well as coarsely hirsute, sometimes almost hispid, leaves lanceolate or linear-lanceolate, entire, or merely denticulate, 5-10 cm. long, densely hirsute; bracts linear-lanceolate, shorter than the hypanthium-tube; free part of the hypanthium about 3 cm. long; sepals about 3 cm. long; petals 3-4 cm. long; capsule 2.5-3 cm. long. *Oenothera biennis hirsutissima* A. Gray. Valleys: N.M.—Colo.—Ariz.—Chihuahua. Jl-S.

3. *O. subulifera* Rydb. Biennial; stem 3-6 dm. high, sparingly hirsute; leaves lanceolate or the lower oblanceolate, densely pubescent, somewhat cinerous, 5-15 cm. long, minutely denticulate; free tube of the hypanthium 1.5-2.5 cm. long; calyx-lobes about 2 cm. long, sparingly hirsute, somewhat glandular; free tips 3-4 mm. long, slender; petals 1.5-2 cm. long; capsule 2.5-3.5 cm.

long, sparingly hirsute. *Onagra strigosa subulata* Rydb. *O. Oakesiana* Rydb. (Fl. Colo.). Valleys: Mont.—Colo. *Submont.* Jl—Au.

4. *O. Cockerellii* De Vries. Biennial, with a taproot; stem erect, strigose-canescens; leaves lanceolate, caudate-attenuate, strigose-canescens, entire, 5–8 cm. long; bracts similar, with involute, curved and twisted tips; calyx-lobes about 2 cm. long, strigose-canescens; free tips about 3 mm. long; petals yellow; capsule about 3 cm. long. Valleys: Colo. *Submont.*

5. *O. muricata* L. Biennial, with a taproot; stem erect, 2–8 dm. high, very leafy, puberulent and usually hirsute, the hairs with reddish pustulate bases; leaves lanceolate, ascending, entire or sinuately denticulate, more or less pubescent; inflorescence dense; calyx-lobes 15–18 mm. long; petals light yellow, 12–15 mm., rarely 2 cm. long, capsule 2.5–3 cm. long, more or less hirsute. Sandy places: Newf.—N.Y.—Colo.—Mont. *Plain—Submont.* Jl—S.

6. *O. ornata* (A. Nels.) Rydb. Stout biennial; stems adscurgent, 4–6 dm. high, very leafy, densely and finely pubescent as well as hirsute; leaves lanceolate or linear-lanceolate, 5–15 cm. long, densely canescens, sinuate-dentate; bracts lanceolate, acute; hypanthium and calyx densely canescens; sepals 2–2.5 cm. long; petals deep yellow or orange, 2–2.5 cm. long; capsule 2–3 cm. long, slightly tapering upwards. *Onagra ornata* A. Nels. Sandy soil: B.C.—Wyo.—Ida. *Submont.* Je—Jl.

7. *O. strigosa* (Rydb.) Mack. & Bush. Biennial or annual; stem erect, 3–10 dm., grayish strigose and hirsute; lower leaves spatulate, the other lanceolate, 5–10 cm. long, more or less repand-dentate; inflorescence leafy; calyx-lobes 1.5–2 cm. long, grayish-hirsute; capsule 2.5–3 cm. long, grayish hirsute. *O. biennis canescens* T. & G. *Onagra strigosa* Rydb. Valleys and sandy places. Minn.—Kans.—Utah—Wash.—B.C. *Plain—Submont.* Je—Au.

8. *O. depressa* Greene. Annual or biennial; stems decumbent, 3–8 dm. long, densely canescens; leaves lanceolate, repand-denticulate, densely white-canescens; inflorescence leafy-bracted; calyx and hypanthium densely canescens, sepals about 12 mm. long; capsule about 3 cm. long, densely canescens. This may be a form of the preceding, produced by cultivation. Dry sandy soil: Mont. Jl—Au.

9. *O. longissima* Rydb. A tall biennial; stem strict, 5–10 dm. high, densely canescens, with short crinkled hairs as well as sparingly hirsute; leaves linear or narrowly linear-lanceolate, 1–1.5 dm. long, densely canescens, entire, acute at both ends; spike rather lax; hypanthium-tube 10–12 cm. long, densely canescens, only slightly widening upwards; sepals linear-lanceolate, about 4 cm. long; free tips about 4 mm. long; petals golden yellow, 4 cm. long; capsule about 4 cm. long, densely canescens, slightly tapering upwards. Cañons: Utah.—Ariz. *Son.* Au—S.

10. *O. Jamesii* T. & G. Biennial; stem decumbent or erect, canescens; leaves ovate, or lanceolate-acuminate, sinuate-dentate, cinereous-canescens, inflorescence leafy, few-flowered; free tube of the hypanthium 8–15 cm. long, more or less pubescent; calyx-lobes 4–6 cm. long; free tips 5–7 mm. long; petals 4–5 cm. long, yellow, turning rose-colored; capsule 2.5–3 cm. long. River valleys: Tex.—Colo.—Ariz. *Son.* Jl—Au.

11. ANÒGRA Spach. WHITE EVENING-PRIMROSE.

Annual or perennial caulescent herbs, often with white flaky bark. Leaves alternate, usually pinnatifid or toothed. Flowers axillary, usually diurnal, from drooping buds. Hypanthium produced beyond the ovary into a cylindric tube. Sepals 4, narrow, reflexed. Petals white, turning pink, obcordate, showy. Stigma with 4 linear lobes. Capsule cylindric, slightly angled, loculicidal, 4-valved, many-seeded. Seeds terete in one row in each cavity of the ovary.

Calyx in bud merely acutish; tips not free or slightly so in no. 4.

Pubescence at least in part consisting of long silky hairs.

Capsule divergent or reflexed.

Blades of the upper leaves rhombic-lanceolate to ovate in outline.

9. *S. minus* A. Nels. A small annual; stems simple or with a few branches at the base, 3-10 cm. high, puberulent; leaves 1-2.5 cm. long, mostly short-petioled; tube of the hypanthium 1.5-2 mm. long; petals 1-1.5 mm. long; capsule nearly straight or somewhat contorted, 2 cm. long, 1 mm. thick. *S. Nelsonii* Heller. Dry hills: Wyo. My.

10. *S. tortum* (Lev.) A. Nels. Annual; stems branched near the base, 1-3 dm. high, more or less strigose; leaves petioled; blades oblanceolate or linear-oblong, strigose or nearly glabrous, 2-4 cm. long; tube of hypanthium 1-2 mm. long; petals ochroleucous, 1-2 mm. long; capsule 2 cm. long, variously twisted. *S. minutiflora* (S. Wats.) Rydb. Sandy soil and dry hills: Wyo.—Colo.—Utah Ore. My-Je.

11. *S. chamaenerioides* (A. Gray) Small. Annual; stem slender, 1-4 dm. high, somewhat viscid-puberulent above; lower leaves petioled, the uppermost sessile; blades lanceolate or oblanceolate, repand-denticulate or entire, 3-6 cm. long; tube of the hypanthium 2 mm. long; petals yellow, 1.5-2 mm. long; capsule linear-cylindric, 3-5 cm. long, 1 mm. thick, straight or slightly curved. Dry places: Tex.—s Utah—Ariz. Son. Mr-My.

12. *S. alyssoides* (H. & A.) Walp. Annual; stem branched, 1-3 dm. high, more or less strigose; leaves petioled; blades oblanceolate or elliptic, 2-6 cm. long, more or less strigose; tube of hypanthium 5-7 mm. long, strigose; petals white or ochroleucous, 5-6 mm. long; capsule linear-cylindric, 2-2.5 cm. long, 1 mm. thick, more or less twisted. *S. implexa* A. Nels. Sandy places and hills: Ida.—Utah—Calif.—Ore. Son. My-Je.

13. *S. macrophylla* (Small) Rydb. Annual; stem 1-3 dm. high, sparingly villous, branched; leaves petioled; blades obovate or broadly spatulate, 3-5 cm. long, more or less villous; tube of the hypanthium 5-6 mm. long, villous; petals white, 7-8 mm. long, broadly obovate. Saline or alkaline soil: Utah—Nev. Son.

14. *S. utahense* Small. Annual; stem erect, 2-10 cm. high, simple or with ascending branches, sparingly villous; leaves short-petioled; blades spatulate or obovate or oval, 1-2.5 cm. long, densely villous, entire or nearly so; calyx-tube 7-9 mm. long; petals obovate, 3-5 mm. long; capsule filiform, 1.5 cm. long, spirally twisted at the base. Sandy soil: Utah. Son. My-Je.

19. CHYLISMIA Nutt.

Caulescent annual herbs. Leaves pinnatifid, but sometimes reduced to the terminal segment. Flowers in terminal racemes, except in one species. Hypanthium produced beyond the ovary into an obconic or funnelform tube. Sepals 4, reflexed. Petals 4, entire, yellow or ochroleucous, sometimes turning purplish. Stamens 8; anthers oblong, attached to the middle. Stigma capitate, entire. Capsule linear or clavate, membranous, peduncled. Seeds in a single row in each cell.

Flowers axillary; delicate plant 1 dm. high or less.

Flowers in terminal racemes or panicles.

Leaf-blades simple, sinuate or entire, or pinnate with the lower leaflets much reduced

Plant glabrous, puberulent, minutely strigose, or glandular.

Petals 3-5 mm. long, leaves glabrous

Petals 7-10 mm. long; leaves grayish-strigose when young

Plant more or less hirsute or villous, with long white hairs

Leaves simple or with a few (1 or 2 pairs, rarely more) small lobes on the

petioles, leaves and stem sparingly hairy

Petals 10-12 mm. long, pod linear, 5-6 cm. long.

Petals 2-7 mm. long; pod clavate, less than 1.5 cm. long

Petals 6-7 mm. long.

Petals 2-5 mm. long.

Petals 4-5 mm. long; stem tall, 3 dm. high or more, branched.

Petals 2-3 mm. long; stem low, about 1 dm. high, simple

Leaves interruptedly pinnate, with several leaflets.

Petals 8-10 mm. long; leaves and lower part of the stem densely hairy.

1. *C. pterosperma*

2. *C. scapoidea*.

3. *C. cruciformis*.

4. *C. brevipes*

5. *C. Parryi*

6. *C. tenuissima*

7. *C. Walkeri*

8. *C. venosa*.

Petals 4-6 mm. long; leaves and stem sparingly hairy or glabrate.

Leaves interruptedly pinnate, the larger alternate pairs 12 or more, not reduced.
 9. *C. parviflora*.
 10. *C. multijuga*.

1. *C. pterosperma* (S. Wats.) Small. Stem slender, 5-10 cm. high, branched, hirsute; leaves oblong-lanceolate, 1-2 cm. long, entire, hispidulous; tube of hypanthium 1 mm. long; petals obcordate, rose-colored, 1.5-2 mm. long; capsule cylindric-clavate, 12-18 mm. long; seeds 2 mm. long, the margins thin, incurved, cellularly tuberculate. *Oenothera pterosperma* S. Wats. Foot-hills: Utah—Calif. Son. My-Je.

2. *C. scapoidea* Nutt. Stem glabrous, 1-3 dm. high, simple or branched at the base; leaves petioled, simple or pinnate, with small lateral leaflets; blade or terminal leaflet ovate or elliptic, 1-4 cm. long, dentate or entire, glabrous, veiny; tube of the hypanthium 2-3 mm. long; petals bright yellow, 3-5 mm. long; capsule 1.5-2 cm. long, 2 mm. thick. *O. scapoidea* Nutt. Hills and river banks: Wyo.—Colo.—Ariz.—Calif.—Ore. Son.—Submont.

3. *C. cruciformis* (Kellogg) Howell. Stem 2-4 dm. high, finely puberulent or glabrate; leaves interruptedly pinnate; leaflets 5-15, lanceolate or ovate, 0.5-4 cm. long, veiny; tube of hypanthium 4-5 mm. long; petals 7-10 mm. long; capsule about 2 cm. long, 2 mm. thick. *O. cruciformis* Kellogg. Dry regions: Ore.—Colo.—Ariz.—Calif. Son. Mr-Je.

4. *C. brevipes* (A. Gray) Small. Stem branched at the base, 2-3 dm. high, usually densely white-hirsute; leaves simple, or pinnate with small lateral leaflets; blade or terminal leaflet ovate, 3-5 cm. long, dentate, veined, hirsute; tube of the hypanthium 5 mm. long; petals yellow; capsule spreading on short pedicels. *O. brevipes* A. Gray. Arid regions: s Utah—Ariz.—Calif.—Nev. Son. Ap-Je.

5. *C. Parryi* (S. Wats.) Small. Stem branched, 2-3 dm. high, sparingly ciliate; leaves simple, petioled; blades ovate or oblong-lanceolate, 2-5 cm. long, entire or sinuate, pubescent with scattered long spreading hairs, especially on the veins; free tube of hypanthium 1 mm. long; petals yellow or orange, 6-7 mm. long; capsule 8-12 mm. long, ascending. Clayey hills: s Utah. L. Son.

6. *C. tenuissima* (M. E. Jones) Rydb. Stem much branched, 3-10 dm. high; leaves mostly simple; blade lanceolate, sparingly dentate, acute at each end, veiny beneath, sparingly pilose, about 1 cm. long; inflorescence racemes or panicles, axillary, with ascending-spreading branches; tube of the hypanthium about 1 mm. long; petals 2-5 mm. long, yellow; capsule clavate, 4-6 mm. long, on divergent pedicels. *O. tenuissima* M. E. Jones. Barren clay soil: Utah. Son. S.

7. *C. Walkeri* A. Nels. Stem slender, 1-2 dm. high, minutely glandular-pubescent and with some long white hairs, leaves simple, entire, ovate to oblong-lanceolate, white-hirsute; tube of hypanthium 0.5 mm. long; petals yellow, oval; capsule clavate, 10-14 mm. long, on a filiform spreading pedicel of the same length. Gypsum hills: w Colo. Son. Jl.

8. *C. venosa* Nels. & Kenn. Stem 3-5 dm. high, villous, becoming glabrate in the inflorescence; leaves 1-2 dm. long, interruptedly pinnate; terminal leaflet orbicular or ovate, 2-4 cm. long, finely canescent above, hirsute beneath, veiny, irregularly serrate; the lateral ones smaller and lanceolate; tube of hypanthium 2.5 mm. long; petals yellow, turning purple, 8 mm. long; capsule 2 cm. long, almost glabrous. Cañons and river valleys: Nev.—Utah. Son. My-Je.

9. *C. parviflora* (S. Wats.) Rydb. Annual; stem 2-3 dm. high, glabrous or sparingly pubescent; leaves interruptedly pinnate, glabrous or nearly so; terminal leaflet ovate, 2-4 cm. long, sharply serrate, strongly-veined, the lateral ones lanceolate, smaller; tube of hypanthium 2 mm. long or less; petals light yellow, 4-6 mm. long; capsule about 3 cm. long, 2 mm. thick. *O. brevipes parviflora* S. Wats. Arid regions: s Utah—Ariz. L. Son.

9. *C. multijuga* (S. Wats.) Small. Stem branched, glabrous, 2-3 dm. high; leaves interruptedly pinnate; larger leaflets 12 pairs or more, of nearly

leaflets broadly ovate to lanceolate, thick, with prominent veins, sharply serrate, with salient mucronate or cuspidate teeth, 2-4 cm. long, obtuse or acute; flowers greenish or tinged with purple; fruit broadly elliptic, more or less scabrous, 4-5 mm. long; dorsal ribs nearly as prominent as the lateral ones. Mountains: Mont.—Wyo.—Utah—Ida. *Submont.—Mont.* Jl—Au.

12. **A. Wheeleri** S. Wats. Stem tall and stout, puberulent; leaves biternate; leaflets ovate-oblong, 5-7 cm. long, acute, incisely serrate, with broad, mucronulate teeth; pedicels hispid; fruit broadly elliptic, 6 mm. long, somewhat pubescent; dorsal ribs thick, narrower than the thick lateral ones. Wet places: Utah. *Son.*

13. **A. ampla** A. Nels. Stem stout, 1.5-2.5 m. high, glabrous, purplish; leaves ternate, then twice pinnate; leaflets ovate or obovate, short-acuminate, serrate or toothed, 5-20 cm. long; bractlets setaceous; fruit broadly oblong, glabrous, 5-7 mm. long; dorsal ribs sharp, hardly winged; lateral wings narrow and thin. Wet meadows and stream banks: Wyo.—Colo. Jl—S.

36. PASTINACA L. PARSNIP.

Stout caulescent biennial, with thick taproot. Leaves pinnately compound, with broad leaflets. Flowers yellow in large umbels. Calyx-teeth obsolete. Stylopodium flat. Dorsal and intermediate ribs slender, the lateral ones strongly winged. Fruit oval or elliptic, glabrous. Seed-face plane.

1. **P. sativa** L. Biennial, with a fusiform root; stem 6-15 dm. high; leaves pinnate; leaflets ovate or oval, sessile, 2-12 cm. long, lobed and incised or dentate; fruit broadly oval, 5-7 mm. long, 4-6 mm. broad, glabrous. Roadsides and waste places: Vt.—Fla.—Calif.—B.C.; escaped from cultivation; native of Eu.

37. HERACLUM L. COW PARSNIP, COW CABBAGE.

Tall stout leafy-stemmed perennials. Leaves ternately compound, with large, broad leaflets. Flowers white, in large umbels. Bracts deciduous; bractlets numerous. Calyx-teeth small or obsolete. Stylopodium thick, conic. Fruit broadly obovate, strongly flattened dorsally, pubescent. Dorsal and intermediate ribs filiform; lateral ribs with broad wings, contiguous to those of the other carpel, strongly nerved towards the outer margin. Oil-tubes solitary in the intervals, conspicuous, about half as long as the carpels, 2-4 on the commissural side. Seeds very strongly flattened; face plane.

1. **H. lanatum** Michx. Tall perennial; stem stout, 1-2.5 m. high, villous, especially above; leaves ternate; sheaths much dilated; leaflets stalked, roundcordate, 1-3 dm. broad, palmately cleft and incised; bracts and bractlets subulate; fruit obcordate, about 1 cm. long, somewhat pubescent. Wet ground: Vt.—N.C.—Calif.—Alaska. *Plain—Mont.* Je—Au.

38. SPHENOSCIADIUM A. Gray.

Thick-rooted perennials, with stout stems, glabrous up to the inflorescence. Leaves once or twice pinnate, with much dilated petioles. Flowers white or sometimes purplish, in umbellate heads. Calyx-teeth obsolete. Stylopodium small, at first flat, becoming conic. Fruit flattened dorsally, cuneate-obovate, hirsute. Carpels strongly flattened, strongly ribbed below, winged above; the dorsal and intermediate wings narrow, the lateral ones broader. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed-face plane.

1. **S. capitellatum** A. Gray. Perennial, with a short caudex and thick root; stem stout, 3-15 dm. high; leaves twice pinnate, glabrous; leaflets lanceolate to oblong or nearly linear, serrate to laciniate, or of the lower leaves entire; inflorescence white-villous; branches 4-15, 2.5-5 cm. long; fruit cuncate-obovoid, about 5 mm. long. Wet meadows: Ore.—Ida.—Calif. *Son.* Jl—Au.

39. CONIOSELINUM Fisch. HEMLOCK-PARSLEY.

Glabrous perennials, with a thick root. Leaves ternate, and then pinnately decomposed, with toothed leaflets. Flowers white, in large umbels. Bracts

more or less conspicuous, or wanting; bractlets numerous, elongate, narrow. Calyx-teeth obsolete. Stylopodium slightly conic. Fruit oblong, dorsally flattened, glabrous. Dorsal and intermediate ribs prominent, sometimes narrowly winged, the lateral ones broadly winged and thick. Oil-tubes usually solitary in the dorsal intervals, 1-several in the lateral ones, and 2-8 on the commissural side. Seed-face plane or slightly concave.

Fruit fully 6 mm. long; oil-tubes 1 or 2 in each interval.
Fruit about 5 mm. long; oil-tubes 2-5 in each interval.

1. *C. scopulorum*.

2. *C. coloradense*.

1. *C. scopulorum* (A. Gray) Coult. & Rose. Stem 6-10 dm. high, glabrous; leaves twice or thrice ternate and then once or twice pinnate; leaflets ovate, pinnately cleft into oblong divisions; bractlets several, linear, elongate; fruit elliptic or oval, about 6 mm. long. Mountain woods: Colo.—N.M.—Ariz.—Ore. *Mont.*—*Subalp.* Jl—Au.

2. *C. coloradense* Osterhout. Stem 5-6 dm. high; lower leaves biternate and the upper ternate, then pinnate; segments narrowly ovate, cleft; bracts and bractlets few, subulate, scarious; fruit broadly oval, 5 mm. long. Mountain woods: Colo.—Wyo. *Mont.*—*Subalp.* Jl—Au.

40. OXYPOLIS Raf.

Smooth, erect, swamp plants, with fascicled tubers. Leaves simply pinnate, or ternate, or reduced to phyllodia. Flowers white. Bract few or none; bractlets numerous, small, or wanting. Calyx-teeth evident. Stylopodium short, thick, conic. Fruit flattened laterally, ovate to obovate, glabrous. Dorsal and intermediate ribs filiform; wings of the lateral ribs closely continuous to those of the other carpel. Oil-tubes solitary in the intervals, 2-6 on the commissural side. Seed-face plane. [*Triedemannia* DC.]

1. *O. Fendleri* (A. Gray) Heller. Stem simple, 3-6 dm. high; leaves pinnate; leaflets 5-9, ovate or oblong, or those of the upper leaves linear-lanceolate, 3-5 cm. long, coarsely serrate; bracts and bractlets none; fruit ovoid, scarcely 4 mm. long; wings thick, about half as broad as the body. *T. Fendleri* A. Gray. Wet creek-banks in the mountains: Wyo.—N.M. *Mont.*—*Subalp.* Je—Au.

FAMILY 94. ARALIACEAE. GINSENG FAMILY.

Aromatic herbs, shrubs, or trees. Leaves alternate or whorled, simple or compound. Flowers inconspicuous, variously disposed, the ultimate divisions of the inflorescence usually umbellate, perfect or polygamous, regular. Sepals 5, often minute. Petals 5 or 10, valvate, or imbricate, inserted in the margin of an epigynous disk. Stamens 5 or 10, alternate with the petals; filaments short, distinct; anthers introrse. Gynoecium of 2-5 united carpels; ovary 2-5-celled; styles usually as many; stigmas simple. Ovules solitary in each cavity, anatropous. Fruit a berry or a drupe. Endosperm copious, fleshy. Embryo straight.

Petals imbricate; drupe 5-celled; leaves pinnately or ternately compound; ours unarmed herbs
Petal valvate in the buds; drupe 2- or 3-celled; leaves simple, palmately lobed; prickly shrubs.
1. ARALIA
2. ECHINOPANAX.

1. ARALIA (Tourn.) L. SASSAPARILLA, SPIKENARD, WILD GINSENG.

Perennial herbs (ours), or shrubs or trees. Leaves alternate, petioled, pinnately or ternately compound, with toothed leaflets. Flowers perfect or polygamous, in racemose or paniculate umbels, or in compound umbels. Sepals 5, often obsolete. Petals 5, imbricate, with obtuse or inflexed tips. Stamens 5; filaments incurved. Ovary 5-celled; styles 5, spreading. Drupe 5-lobed, 5-celled, black, fleshy. Seeds flattened.

1. *A. nudicaulis* L. Acaulescent perennial herb, with a long rootstock; leaves ternate, long-petioled; primary divisions pinnately 3-5-foliate; leaflets

long, 5–10 mm. wide, oval, glabrous, dark green above, glaucous beneath, somewhat revolute on the margins; sepals ovate, concave, about 3 mm. long, purple; corolla bluish purple, 10–14 mm. wide Cold bogs: Alaska—Calif.—Colo.—Alta. *Mont.*—*Subalp.* Je—Au.

6. **ANDRÓMEDA** L. BOG ROSEMARY

Glabrous evergreen shrubs, with coriaceous, entire, revolute-margined leaves. Flowers perfect, in terminal umbels. Sepals 5, persistent. Corolla globose-urceolate, 5-toothed, with recurved teeth. Stamens 10, included; filaments bearded, unappendaged; anthers short, ovate, obtuse; sacs opening by a terminal pore, each with an ascending awn. Disk 10-lobed. Ovary 5-celled; style columnar; ovules many. Capsule subglobose, 5-angled, 5-valved, loculicidal. Seeds with smooth testa, coriaceous, shining.

1. **A. polifolia** L. Shrub, 1–3 m. high, with acid foliage; leaf-blades oblong to linear, 3–5 cm. long, 3–8 mm. wide, dark green above, white beneath, mucronulate, the margins usually strongly revolute; bracts ovate, glaucous; pedicels 5–10 mm. long; sepals triangular, acute, about 1 mm. long, corolla pink, about 9 mm. long. In swamps: Lab.—N.J.—Ida.—Wash.—Alaska; Eurasia. Je—Jl.

7. **CASSIOPE** D. Don. MOSS-PLANT, WHITE HEATHER.

Evergreen low branching shrubs, with thick, opposite, crowded, imbricate, 4-ranked leaves and axillary nodding flowers. Sepals usually 5, not bracted, imbricate, thickened at the base. Corolla campanulate, usually 5-lobed. Stamens 8–10, included; anthers attached to the filaments near the apex; sacs opening by large terminal pores and tipped with recurved awns. Disk 10-crenate. Ovary 4–5-celled; style slender, somewhat thickened below. Capsule globose or ovoid, loculicidal, 4–5-valved.

Leaves with a deep furrow on the back --

1. *C. tetragona*.

Leaves without furrow on the back

2. *C. Mertensiana*.

1. **C. tetragona** (L.) D. Don. Tufted shrub, with erect or ascending branches, 1–3 dm. high; leaves very thick, ovate, 2–5 mm. long, more or less pubescent; peduncles 1–2.5 cm. long, glabrous or nearly so; sepals ovate, 2–2.5 mm. long, acute; corolla white or rose-colored, 5–6 mm. long. Wet places: Greenl.—Lab.—B.C.—Alaska, Eurasia. *Subalp.*—*Alp.* Jl—Au

2. **C. Mertensiana** (Bong.) D. Don. Tufted shrub, with ascending branches, 1–3 dm. high; leaves ovate, 2–4 mm. long, round-keeled on the back, glabrous or nearly so; peduncles 1–1.5 cm. long, glabrous or puberulent, sepals 2–3 mm. long, ovate, usually pinkish, acute; corolla 5–8 mm. long, white or slightly tinged with rose. Wet places in the mountains: Alaska—n. Calif.—Mont.—Alta. *Subalp.*—*Alp.* Jl—Au

8. **GAULTHERIA** (Kalm) L. CREEPING WINTERGREEN.

Shrubs or undershrubs, with alternate evergreen leaves. Flowers perfect, solitary, axillary, or in axillary racemes. Hypanthium and calyx enlarging and becoming fleshy, enclosing the capsule and forming a berry-like fruit. Sepals 5. Corolla campanulate or urn-shaped. Stamens 10; filaments dilated below, included; anther-sacs opening by terminal pores, 2-awned or 2-pointed. Disk 10-toothed. Ovary and capsule 5-celled, 5-lobed.

Glabrous; leaves oval or orbicular.

1. *G. humifusa*.

Calyx, pedicels, and upper part of the stem sparingly hirsute; leaves ovate

2. *G. ovatifolia*.

1. **G. humifusa** (Graham) Rydb. Cespitose, depressed, procumbent undershrub, 3–10 cm. high, glabrous; leaf-blades finely crenate or entire-margined, 1–2 cm. long; corolla open-campanulate, 5-lobed, white, about 3 mm. long; filaments glabrous; fruit scarlet, 5–6 mm. in diameter. *G. Myrsinites* Hook. Wooded mountain sides: B.C.—Calif.—Colo.—Alta. *Submont.*—*Subalp.* Jl.

2. **G. ovatifolia** A. Gray. Low depressed shrub, 1–2 dm. high, with more or less hirsute stems; leaf-blades ovate, acute, serrate, glabrous, rather thick,

1.5-3.5 cm. long; pedicels one-flowered; corolla white, about 4 mm. long; fruit scarlet, 7-8 mm. in diameter. Woods: B.C.—Ore.—Ida. *Submont.* Je-Jl.

9. ARCTŌUS (A. Gray) Niedzu. ALPINE BEARBERRY.

Low caespitose shrubs, with shreddy bark and alternate deciduous leaves, clustered towards the ends of the branches. Flowers few, in fascicles from terminal scaly buds. Sepals 4-5, short. Corolla globose-urceolate, 4-5-toothed. Stamens 8-10, included, anther-sacs with 2 recurved dorsal awns. Fruit drupaceous, with 4-5 1-seeded nutlets [*Mairiana* Neck.]

Fruit black; corolla-lobes ciliate, leaves less than 3 cm. long

1. *A. alpina*.

Fruit red, corolla-lobes not ciliate, leaves usually more than 3 cm. long.

2. *A. erythrocarpa*

1. ***A. alpina*** (L.) Niedzu. Depressed-prostrate shrub, with branches 5-12 cm. high; leaf-blades spatulate or obovate, tapering below into short petioles, 2-3 cm. long, 1-1.5 cm. wide, crenate, strongly veined, glabrous, except the ciliate margin; corolla white or pink; fruit 5-7 mm. in diameter, bluish black when ripe. *Arctostaphylos alpina* (L.) Spreng. In alpine-arctic localities: Greenl.—N.H.—B.C.—Alaska, Eurasia. *Subalp.*—*Alp.* My-Je.

2. ***A. erythrocarpa*** Small. A depressed shrub, 1-2 cm. high; leaf-blades spatulate, 3-6 cm. long, tapering below into short petioles, crenate, glabrous, not ciliate, corolla white or pinkish, turning yellowish; fruit 7-10 mm. in diameter, bright red. Mountains: Alta.—B.C.—Yukon. *Subalp.*—*Alp.* My-Je.

10. ARCTOSTÁPHYLOS Adans. BEARBERRY, KINNIKINICK, MANZANITA.

Shrubs or small trees, with alternate, thick, evergreen leaves. Flowers perfect in terminal, bracteolate racemes, often pendulous. Sepals 5, persistent. Corolla urn-shaped, with 4-5 recurved lobes. Stamens 8-10; filaments dilated and hairy at the base; anthers with 2 reflexed awns on the backs, opening by terminal pores. Ovary 4-10-celled, with a single pendulous ovule in each cell. Fruit drupaceous, either with a 1-8-seeded stone or 1-8 one-seeded more or less coalescent stones [*Uva-ursi* Mill.]

Depressed creeping glabrous plant, with spatulate leaves

1. *A. Uva-ursi*.

Erect shrubs or trees, 1-6 m. high, with oval leaves

Young branches puberulent, leaves usually pungent-cuspidate.

2. *A. pungens*

Branches glabrous, leaves usually not cuspidate

3. *A. platyphylla*.

1. ***A. Uva-ursi*** (L.) Spreng. Depressed and trailing, diffusely branched shrub, forming patches 1-2 m. across; leaves short-petioled, coriaceous; blades spatulate, entire-margined, obtuse, glabrous or nearly so, 1-3 cm. long, finely reticulate; racemes short and crowded; sepals ovate, acute; corolla ovoid-urn-shaped, white, about 4 mm. long, fruit rather dry, insipid, mealy, red, 6-10 mm. in diameter. Woods. Lab.—N.J.—Colo.—Calif.—Alaska; Eurasia. *Submont.*—*Mont.* My-Je.

2. ***A. pungens*** H.B.K. Shrub 1-7 m. high, with puberulent branches; leaf-blades very thick, entire-margined, elliptic or oval, rounded at the base, pungent, acuminate at the apex, glabrous above, minutely puberulent beneath, 1.5-3 cm. long; sepals ovate; corolla 5-6 mm. long; fruit 8 mm., rarely 10 mm. in diameter. Wooded mountains: Mex.—N.M.—s Utah—s Calif. *Son.* Ap-My.

3. ***A. platyphylla*** (A. Gray) Rydb. Shrub about 1 m. high, with glabrous branches; leaf-blades ovate, entire-margined, merely acute, 2-4 cm. long, thick and light green; sepals ovate, obtuse or acutish; corolla about 6 mm. long; fruit usually 1 cm. or more in diameter. Woody mountain sides: e Colo.—Utah—Calif. *Son.*—*Mont.* My-Jl.

FAMILY 99. **VACCINIACEAE.** HUCKLEBERRY FAMILY.

Shrubs or small trees, or rarely delicate vines. Leaves alternate, simple, sometimes evergreen. Flowers perfect, clustered or solitary. Hypanthium well developed, more or less completely enclosing and adnate to the ovary.

Sepals 4 or 5. Corolla usually gamopetalous, 5- or 4-lobed, rarely of free petals. Stamens twice as many as the lobes of the calyx or corolla. Gynoeceum of 5 or 4 united carpels. Ovary 4-10-celled, inferior, crowned by an epigynous disk. Fruit a berry or drupe, pulpy.

Petals united into a gamopetalous corolla.

- | | |
|---|-------------------------|
| Ovary half-inferior, berry white, acute; low creeping plants | 1. <i>CHIÖGENES</i> |
| Ovary wholly inferior, berry blue, black, or red, rounded; shrubs or undershrubs. | 3. <i>CYANOCOCCUS</i> . |
| Filaments glabrous; anthers 2-awned on the back; leaves deciduous. | 4. <i>VITIS-IDAEA</i> . |
| Filaments pubescent; anthers awnless. | 5. <i>OXYCOCCUS</i> . |
| Ovary and berry incompletely 10-celled, by a false partition, intruding from the back of each cell; leaves thin, deciduous. | |
| Ovary and berry 4- or 5-celled; no false partitions; leaves leathery, persistent. | |

Petals distinct, delicate prostrate vines.

1. *CHIÖGENES* Salisb. CREEPING SNOWBERRY, MOXIE PLUM, CAPILLAIRE.

Evergreen shrubs, with prostrate stems. Leaves alternate, 2-ranked. Flowers solitary, subtended by two bracts. Sepals 4, free. Corolla campanulate, with 4 rounded lobes. Stamens 8, included; filaments rough; anthers awnless; sacs not prolonged into tubes at the apex. Ovary and berry 4-celled, the latter white, mealy.

1. *C. hispidula* (L.) T. & G. Stems slender, creeping, 1-3 dm. long, strigose; leaves short-petioled, dark green and glabrous above, pale and with scattered brown appressed hairs beneath, ovate, acute, 3-6 mm. long; pedicels very short; corolla short-campanulate, 1.5-2 mm. long; berry hispid, 5-6 mm. in diameter. Cold woods: Newf.—N.C.—Mich.—Ida.—B.C. *Boreal*. My-Je.

2. *VACCINIUM* L. BILBERRY, WHORTLEBERRY, HUCKLEBERRY.

Low shrubs, with alternate, thin, deciduous leaves. Flowers on drooping pedicels, solitary or two to four together. Calyx-lobes 5 or 4, small. Corolla more or less urceolate, 5- or 4-toothed, rose-colored or white. Filaments glabrous; anthers 2-awned on the back, included. Stamens 8-10. Ovary and fruit 4-5-celled, without false partitions. Fruit sweet and edible, blue, black, or red, with or without a bloom.

Branches not angled.

Leaves entire-margined.

Leaves broadly obovate or oval, strongly reticulate.

Leaves oblong-obovate to oblanceolate, pale, not strongly reticulate

1. *V. uliginosum*.

2. *V. occidentale*.

3. *V. caespitosum*.

Leaves serrate.

Branches angled.

Fruit purplish, black, or blue; leaves more than 1 cm. long.

Corolla depressed-globular; fruit purple, leaves obtuse or acute, crenulate or subentire

4. *V. globulare*.

Corolla rounded-ovoid

Leaves subentire, obtuse, fruit blue, with a bloom

5. *V. oxycarpum*.

Leaves serrate, acute or acuminate, fruit black, without a bloom.

Shrub tall; leaves 2-5 cm. long, fruit 8-10 mm in diameter

6. *V. membranaceum*

Shrub low, 1-3 dm. high, leaves 1-1.5 cm long; fruit 5-8 mm in diameter.

7. *V. oxycarpum*

Fruit bright red; leaves usually less than 1 cm. long.

Leaves serrate, light green on both sides

8. *V. scoparium*.

Leaves entire, dull and pale, especially beneath.

9. *V. parvifolium*.

1. *V. uliginosum* L. Shrub 1-6 dm. high; leaves glabrous, green above, pale beneath, 1-2 cm. long; corolla pink, ovoid-urceolate, only slightly contracted at the throat, 4-5-toothed; berry blue, with a bloom, globose-ellipsoid, about 6 mm. in diameter. Bogs: Greenl.—N.Y.—B.C.—Alaska; Eurasia. My-Jl.

2. *V. occidentale* A. Gray. Shrub 2-10 dm. high; leaves thin, 1-2 cm. long, only slightly paler beneath; corolla ovoid-urceolate, about 5 mm. long; berry blue, with a bloom, 4-5 mm. in diameter. Wet places in the mountains: B.C.—Calif.—Utah—Mont. *Submont.*—Mont. Je-Au.

3. *V. caespitosum* Michx. Shrub 0.5-3 dm. high; leaves rather thin, obovate, cuneate or oblanceolate, glabrous; corolla ovoid-urceolate, 4-5 mm. long; berry blue, with a bloom, 6-8 mm. in diameter. Alpine-arctic situations: Lab.—N.H.—Colo.—B.C. *Subalp.—Alp.*

4. *V. globulare* Rydb. Shrub 3-8 dm. high; leaf-blades 1-4 cm. long, thin, broadly oval or obovate, somewhat paler beneath; corolla yellowish white, about 6 mm. in diameter; berry dark purplish blue, 6-8 mm. in diameter. Woods: B.C.—Ore.—Utah.—Mont. *Submont.—Mont.* My-Jl.

5. *V. ovalifolium* Smith. Shrub 2-3.5 dm. high; leaf-blades elliptic, oval, or oblong-oval, entire-margined, bright green above, pale beneath, 3-5 cm. long; corolla ovoid-urceolate, about 8 mm. long and 5-6 mm. in diameter; berry 8-10 mm. in diameter. Woods: Alaska—Ore.—Mich.—Que. *Submont.—Mont.* My-Jl.

6. *V. membranaceum* Dougl. Shrub 3-15 dm. high; leaf-blades thin, oval, only slightly paler beneath, 3-5 cm. long; corolla ovoid-urceolate, about 5 mm. long, 4 mm. wide; berry 8-10 mm. in diameter. *V. myrtilloides* Hook. Woods: B.C.—Calif.—Wyo.—Mich. *Submont.—Mont.* Je-Jl.

7. *V. oreophilum* Rydb. Shrub 1-3 dm. high; leaf-blades ovate or oval, thin, 1 cm. or less, ovate or lance-ovate, acute at both ends, serrulate; corolla ovoid-urceolate, 3 mm. or less long; berry red, about 5 mm. in diameter. *V. Myrtilus* Hook., not L. Mountain woods: B.C.—N.M.—Alta. *Mont.—Alp.* Je.

8. *V. scoparium* Leiberg. Shrub 1-2 dm. high; leaf-blades light green, thin, 1 cm. or less, ovate or lance-ovate, acute at both ends, serrulate; corolla ovoid-urceolate, 3 mm. or less long; berry red, about 5 mm. in diameter. *V. erythrococcum* Rydb. GROUSE-BERRY. Mountain sides: B.C.—Calif.—Colo.—Alta. *Submont.—Subalp.* Je-Jl.

9. *V. parvifolium* Smith. Shrub 2-4 m. high; branches green, sharply angled; leaves oblong or oval, obtuse or rounded at both ends, pale and dull, entire, 6-20 mm. long; corolla globular; pedicels nodding in fruit; berry light red, rather dry. Shady woods: Calif.—Ida.—B.C.—Alaska. *Submont.—Mont.*

3. CYANOCÓCCUS (A. Gray) Rydb. BLUEBERRY.

Shrubs with alternate, thin, deciduous leaves. Flowers in fascicles or very short racemes, developed with the leaves, from separate scaly buds; bracts and bractlets scaly, mostly deciduous. Calyx-lobes 5, usually small. Corolla in ours campanulate, white or slightly rose-colored; lobes 5. Stamens 10; filaments hairy; anthers awnless. Ovary and fruit incompletely 10-celled, by false partitions or projections from the back of each carpel; berry blue or black, with a bloom, sweet and edible, many-seeded.

Leaves entire, as well as the branches pubescent.

Leaves serrate, glabrous, except sometimes the veins and margins; or with pubescent lines

1. *C. canadensis*.

2. *C. pennsylvanicus*.

1. *C. canadensis* (Richards.) Rydb. Shrub 3-6 dm. high; leaves broadly lanceolate, acute at both ends, softly pubescent, especially beneath, 2-4 cm. long, 8-18 mm. wide; corolla cylindro-campanulate, about 4 mm. long and 3 mm. in diameter; berry bluish black, with a bloom, 5-8 mm. in diameter. *Vaccinium canadense* Richards. Moist places: Lab.—Va.—Ill.—Sask. *Boreal.* My-Je.

2. *C. pennsylvanicus* (Lam.) Rydb. Shrub 1-4 dm. high, with warty branches; leaves oblong or oblong-lanceolate, slightly pubescent on the veins beneath and the margins, acute at both ends, 2-4 cm. long; corolla as in the preceding; berry 6-10 mm. in diameter, bluish black, with a bloom, very sweet. *V. pennsylvanicum* Lam. Hillsides and woods: Newf.—N.J.—Ill.—Sask. *Boreal.* My-Je.

4. VITIS-IDAEA (Tourn.) Moench. MOUNTAIN CRANBERRY, SWEDISH CRANBERRY.

Low shrubs, with coriaceous, persistent leaves. Flowers in short racemes from separate buds. Calyx-teeth small, 4 or 5. Corolla urceolate or campanu-

10. *CENTUNCULUS* L. FALSE PIMPERNEL, CHAFFWEED.

Small depressed caulescent annuals. Leaves alternate or the lower opposite. Flowers minute, axillary, solitary. Sepals 4 or 5, united below, persistent. Corolla not exceeding the calyx; tube subglobose; lobes entire, spreading. Stamens 4 or 5, inserted in the throat; filaments dilated; anthers cordate. Ovary 1-celled; style filiform; stigma capitate. Ovules numerous, half-anatropous. Capsule subglobose, circumscissile; seeds numerous.

1. *C. minimus* L. Slender annual, 2-15 cm. high; leaves subsessile, obovate or oblong, 4-8 mm. long; flowers sessile or nearly so; sepals linear or linear-lanceolate, acuminate; corolla pink; lobes lanceolate. Moist soil: Ill.—Fla.—L. Calif.—B.C.; Eu. and S. Am. *Plain—Submont.* Ap-S.

11. *GLAUX* (Tourn.) L. BLACK SALTWORT, SEA MILKWORT.

Small caulescent herbs, perennial. Leaves opposite, entire, sessile. Flowers small, axillary. Calyx campanulate, 5-lobed; the lobes petaloid, pink or white, imbricate in the bud. Corolla wanting. Stamens 5, inserted at the base of the calyx, alternate with its lobes; filaments filiform-subulate; anthers cordate. Capsule 5-valved at the top, few-seeded.

1. *G. maritima* L. Succulent leafy perennial; stems 0.5-3 dm. high, glabrous; leaves sessile, from oval to linear-oblong, 4-12 mm. long; calyx campanulate, about 3-4 mm. long, pinkish or white; lobes oval, rounded. Saline soil: Newf.—N.J.—Colo.—Ore.—Alaska; Eurasia. *Plain—Submont.* Je-Au.

12. *DODECATHÉON* L. SHOOTING STAR, AMERICAN COWSLIP, BIRD-BILLS.

Scapose perennials, with short rootstocks. Leaves in basal rosettes. Flowers umbellate on solitary scapes, nodding. Calyx-lobes 4 or 5, longer than the tube, reflexed in flower. Corolla hypogynous; tube very short; lobes 5 or 4, imbricate in the bud, reflexed, many times as long as the tube. Stamens 5 or 4, exserted; filaments usually united; anthers attached by their bases. Ovary 1-celled, free; style filiform; stigma capitate. Ovules numerous, half-anatropous. Capsule partially 5-valved, the very apex in some species separating off as a lid. Seeds numerous.

Anthers subsessile or nearly so; tube of the filaments if any less than 0.5 mm. long
Leaf-blades thin, ovate, sinuately dentate, truncate, subcordate or obtuse at the base; anthers strictly sessile.

Leaf-blades thicker, linear, oblanceolate or oval, entire or minutely denticulate, gradually tapering at the base.

Filaments purple; plant with a distinct, often bulbiferous rootstock.

Leaf-blades linear or narrowly linear-oblanceolate, entire.

Plant low; corolla-lobes 10-18 mm. long.

Plant tall; corolla-lobes 20-25 mm. long.

Leaf-blades broadly oblanceolate or elliptic; margins callous-denticulate.

Filaments yellow; rootstock merely a short vertical crown, bearing the leaves and fleshy roots; bulblets none

Leaves glabrous.

Leaves distinctly petioled

Scape low, few-flowered; capsule circumscissile near the apex; connective rugose

Leaf-blades oval, elliptic, or obovate; capsule 10-12 mm. long.

Leaf-blades oblanceolate or oblong, spatulate, capsule 15-20 mm. long.

Scape tall, many-flowered; capsule opening by valves from the apex; connective not rugose.

Leaves subsessile.

Leaves pubescent.

Anthers not subsessile; filaments united into a distinct tube, 1-3 mm. long.

Leaves glabrous.

Capsule circumscissile near the apex; anthers more than twice as long as the tube of the filaments.

Filaments and throat of the corolla indigo blue; leaf-blades obovate.

Filaments and throat of the corolla yellow.

Petals oblong-lanceolate, obtuse or acutish.

10. *D. Hendersoni*.

6. *D. cylindrocarpum*.

7. *D. multiflorum*.

8. *D. pulchrum*.

9. *D. pubescens*.

5. *D. confugens*.

3. *D. Jeffreyi*.

2. *D. alpinum*.

1. *D. dentatum*.

- Petals lanceolate, long-acuminate.
 Capsule opening by valves from the apex.
 Anthers more than twice as long as the short filaments.
 Leaf-blades oval or oblong; bracts oblong, mostly obtuse; plant slender; flowers 1-3 (rarely 4-5).
 Leaf-blades oblanceolate; bracts lanceolate, acute; plant usually stout and many-flowered.
 Anthers less than twice as long as the filaments.
 Whole plant glabrous.
 Bracts lanceolate, acute; anthers 4-5 mm. long, half longer than the filament-tube.
 Bracts oblong, obtuse; anthers 3-4 mm. long, only slightly longer than the filament-tube.
 Bracts, upper part of the peduncle, and pedicels puberulent; bracts small, lanceolate, acute, anthers 3-4 mm. long.
 Leaves pubescent.
 Plant 1-2 dm. high, usually more than one-flowered; leaves with long petioles.
 Plant about 5 cm. high, usually 1-flowered; petioles obsolete.
11. *D. acuminatum*.
 12. *D. phloscia*.
 13. *D. radiculatum*.
 14. *D. pauciflorum*.
 15. *D. salinum*.
 16. *D. puberulentum*.
 17. *D. Cusickii*.
 18. *D. uniflorum*.

1. ***D. dentatum*** Hook. Leaves with winged petioles, 3-10 cm. long; blades elongate-ovate, sinuate-dentate, obtuse, 3-10 cm. long, very thin, glabrous; scape 2-3 dm. high, few-flowered; calyx-tube about 5 mm. long, glabrous; lobes lanceolate, acuminate, about 4 mm. long; corolla white; lobes oblong, obtuse, 8-10 mm. long; anthers about 5 mm. long, tapering upwards, but obtuse; connective purple, smooth; capsule oblong, about 1 cm. long, opening by valves from the apex. *D. Meadia latilobum* A. Gray. Rich wet soil in woods: Ore.—Utah—Ida.—B.C. Je—Jl

2. ***D. alpinum*** (A. Gray) Greene. Leaves linear-ob lanceolate, 3-15 cm. long, 5-10 mm. wide, glabrous, obtuse at the apex, entire; scape 1-3 dm. high, usually few-flowered; calyx-tube 2 mm. long; lobes lanceolate, acute, 3-4 mm. long; corolla bluish purple; lobes lanceolate, 10-18 mm. long; anthers linear, about 7 mm. long; connective purple, smooth; capsule oblong-ellipsoid, about 7 mm. long, opening by valves from the summit. Mountain valleys: Calif.—Utah. *Submont.*—*Mont.* Je—Au.

3. ***D. Jeffreyi*** Moore. Leaves linear or linear-ob lanceolate, 1-2 dm. long, 1-2 cm. wide, glabrous, acutish, entire; scape 2-4 dm. high, several-flowered; calyx-tube 4-5 mm. long; lobes lanceolate, acute; corolla bluish purple; lobes 2-2.5 cm. long, lanceolate; anthers about 1 cm. long; connective smooth, purple; capsule opening by valves from the summit. ? *D. dispar* A. Nels. Mountain valleys: Calif.—Ida.—B.C. *Submont.*—*Mont.* Je—Au.

4. ***D. viviparum*** Greene. Leaves oblong to oblanceolate, 6-15 cm. long, acute or obtuse, sinuately toothed; scape 1.5-4 dm. high; calyx-tube 3-4 mm. long; lobes lanceolate, acute or acuminate; corolla purple; lobes linear, 1-2 cm. long, acute or obtuse; anthers linear, 7-9 mm. long; connective narrow, purple; capsule circumscissile near the apex and later splitting, ovoid, about 1 cm. long. *D. crenatum* Greene. Wet places in the mountains: Alaska—Mont.—Ore. *Submont.*—*Mont.* Jl—Au.

5. ***D. conjugens*** Greene. Leaves glabrous, oval, elliptic, or rarely obovate, 1.5-4 cm. long, 1-2 cm. wide, rounded at the apex, abruptly contracted at the base; scape 1-2 dm. high, 1-4-flowered; calyx-tube 4 mm. long; lobes lanceolate, acute, about 5 mm. long; corolla from deep purple to rose or white; lobes linear, acute, 15-18 mm. long; anthers 7-8 mm. long, mostly obtuse; connective broad, lanceolate, white, rugose; capsule oblong, 10-12 mm. long, circumscissile near the apex. Moist places: Ore.—Wyo.—Mont. *Submont.*—*Mont.* Ap.

6. ***D. cylindrocarpum*** Rydb. Leaf-blades oblanceolate, or oblong-spatulate, glabrous, 4-10 cm. long, 1-2 cm. wide, obtuse at the apex, gradually tapering below; scape 1-2 dm. high, glabrous; calyx-tube 3-4 mm. long; lobes 3-4 mm. long; corolla purple or white; lobes linear to lanceolate, 1-2 cm. long; anthers 5-7 mm. long, usually acute; connective lanceolate, white, rugose; capsule 15-20 mm. long, circumscissile near the apex. *D. albidum* Greene. Wet places: e Wash.—Mont. *Mont.* My.

7. ***D. multiflorum*** Rydb. Leaves about 2 dm. long, sinuate-denticulate, obtusish, narrowly oblanceolate, tapering below; scape stout, 3-4 dm. high;

flowers 10-20; calyx-tube 5-6 mm. long; lobes lanceolate, about 5 mm. long; corolla bluish violet, paler in the throat, but without any markings; lobes oblong, obtuse; anthers narrowly linear-lanceolate, acute, 7-8 mm. long; connective narrow, lance-subulate; capsule about 12 mm. long, cylindric-ovoid, septicidal from the apex. River valleys: Colo.—Wyo. *Mont.* Je-Jl.

8. *D. pulchrum* Rydb. Leaves glabrous, obovate-elliptic, 7-8 cm. long, without distinct petioles, thin, wavy, acute or obtuse, scape about 2 dm. high, 5-7-flowered; corolla rose or purplish, with a deep purple wavy line in the throat; lobes about 2 cm. long, broadly oblong; anthers 6-7 mm. long, obtuse; connective purple, lanceolate, rugose at the base. Creek-banks: Yellowstone Park. *Mont.* Je.

9. *D. pubescens* Rydb. Leaves 2-4 cm. long, elliptic or broadly spatulate, densely and finely pubescent, obtuse at the apex, abruptly contracted into short petioles; scape about 1 dm. long, 2-5-flowered; calyx-lobes lanceolate, acute, about 4 mm. long; corolla bluish purple; lobes linear-oblong, acutish, about 7 mm. long; anthers about 5 mm. long, acute; connective lanceolate, yellow, rugose; capsule cylindric about 1 cm. long. Wet places: w *Mont.* *Submont.* Ap.

10. *D. Hendersoni* A. Gray. Leaves thick, 4-10 cm. long; blades orbicular, oval, broadly oval or obovate, entire or callous-denticulate, rounded at the apex, abruptly contracted into short petioles; scape 2-3 dm. high, 6-12-flowered; calyx-tube 4-5 mm. long; lobes lanceolate, acuminate, about 4 mm. long; corolla with a dark indigo lobed center; outer part of the throat light-colored; lobes oblong, obtuse, 15-20 mm. long, purple or lilac; anthers linear, 4-5 mm. long, obtuse; capsule oblong, about 1 cm. long. Hillsides: B.C.—Calif.—Ida. *Submont.* Mr-My.

11. *D. acuminatum* Rydb. Leaves 5-6 cm. long, rather fleshy, glabrous or minutely puberulent; blades entire-margined, oblong-elliptic, usually obtuse at the apex, tapering into short petioles; scape 1-1.5 dm. high, 3-5-flowered; calyx-lobes lanceolate; corolla whitish, tinged with purple or rose; lobes lanceolate, 12-15 mm. long, acuminate; anthers 6-7 mm. long; connective purple, broad and rugulose at the base. Wet open slopes: *Mont.*—Wyo. *Submont.* Ap-Jl.

12. *D. philoscia* A. Nels. Leaves 3-10 cm. long, rather thin, glabrous; blades oval to oblong, obtuse or rounded at the apex, contracted into short petioles; scape 1-2 dm. high, slender, 1-3-flowered (rarely 4-6-flowered); calyx-tube about 2 mm. long; lobes lanceolate, 2-3 mm. long; corolla purple or violet, usually with a dark wavy line in the throat; lobes linear-oblong or linear, acute or obtuse, 12-18 mm. long; anthers linear, acute, about 6 mm. long; capsule oblong, 8-10 mm. long. Gravelly margins of streams: Wyo.—Colo. *Submont.* —*Mont.* Je-Au.

13. *D. radiculatum* Greene. Leaves 5-20 cm. long; blades oblanceolate, or rarely elliptic, entire-margined or (in the v. *sinuatum*) sinuate, obtuse or acutish at the apex, tapering below into short petioles; scape 1-4 dm. high, 5-15-flowered; calyx-tube 3-4 mm. long; lobes linear-lanceolate, about 6 mm. long; corolla purple, with a very dark wavy line in the throat; lobes linear or oblong, obtuse, 15-18 mm. long; anthers linear, acute, 5-6 mm. long; capsule oblong-ovoid, about 12 mm. long. Wet meadows: S.D.—Kans.—N.M.—Wyo. *Plain—Mont.* My-Jl.

14. *D. pauciflorum* (Durand) Greene. Leaves glabrous, 3-10 cm. long; blades oblanceolate, entire-margined, obtuse at the apex, tapering into more or less elongate petioles; scape 1-4 dm. high, 1-10-flowered; calyx-tube 2 mm. long; lobes lanceolate, about 4 mm. long; corolla purple, with a very dark wavy line in the throat; anthers 4-5 mm. long, linear, usually obtuse; capsule elongate-oblong, 12-15 mm. long. Wet meadows: Mack.—Sask.—Colo.—Wash.—B.C. *Plain—Mont.* Je-Au.

15. *D. salinum* A. Nels. Leaves 2-4 cm. long, spreading, glabrous; blades elliptic or oblanceolate, rarely obovate, obtuse, thin, entire-margined, tapering

Seed-coats lamellose-rugose, the lamellae white, forming hexagonal areas, basal rosettes of leaves remaining at flowering time; perennials with short rootstocks.

Corolla 12-18 mm. long; leaves ovate or oval. 1. *D. glauca*.

Corolla 30-40 mm. long; leaves linear or linear-oblancoaleate. 2. *D. Romanzovii*.

Seed-coats smooth, but often produced into wings; basal rosettes none at flowering time; caespitose perennials.

Corolla closed; lobes in ours obsolete or nearly so, limb as well as the plaits incurved. 3. *D. Andrewsii*.

Corolla open, campanulate; lobes spreading or ascending.

Calyx-lobes broadly ovate or oval; seeds wingless.

Corolla-lobes rounded at the apex, calyx-tube 5-6 mm. long. 4. *D. obtusiloba*.

Corolla-lobes acute; calyx-tube 7-10 mm. long.

Leaves broadly ovate, usually obtuse at the apex and subcordate at the base; calyx-lobes obtuse. 5. *D. calycosa*.

Leaves ovate or lance-ovate, acute at both ends; calyx-lobes acute. 6. *D. monticola*.

Calyx-lobes linear, lanceolate, or none

Floral leaves more or less broadened and more or less scarious; seeds usually wingless. 7. *D. Parryi*.

Floral leaves narrow, not scarious; seeds winged

Calyx-lobes erect or none; corolla-lobes ascending or nearly erect, not toothed; plaits equally lobed

Flower-cluster dense, its branches, peduncles, and internodes very short

Leaves all except the floral ones ovate, oblong, or lanceolate.

Calyx-lobes well developed; calyx-tube truncate at the apex.

Leaves ovate or rarely lanceolate; calyx-lobes oblong or oblong-lanceolate; corolla open-funnelform. 8. *D. oregana*.

Leaves oblong or lanceolate; calyx-lobes linear or linear-lanceolate; corolla narrowly funnelform. 9. *D. affinis*.

Calyx-lobes none or minute; calyx-tube irregular, more or less lobed or cleft. 10. *D. Forwoodii*.

Upper stem-leaves linear or lance-linear.

Plant erect, many-flowered; corolla nearly cylindraceous, 2-2.5 cm. long. 11. *D. Bigelovii*.

Plant decumbent, few-flowered, corolla funnelform, 2-3 cm. long, or more. 12. *D. interrupta*.

Flower-cluster lax, its branches, lower peduncles, and internodes elongate. 13. *D. puberula*.

Calyx-lobes widely spreading, linear-lanceolate; corolla-lobes in anthesis strongly spreading, more or less denticulate; plaits unequally 2-lobed.

1. *D. glauca* (Pallas) Rydb. Stem simple, 2-10 cm. high; basal leaves rosulate, oval or obovate, 0.5-1.5 cm. long, rather fleshy; stem-leaves 2-3 pairs, oval or obovate, about 1 cm. long; calyx-tube 5-6 mm. long; lobes lanceolate, about 1.5 mm. long; corolla blue; lobes ovate, obtuse; lobes of the plaits ovate, entire. *Gentiana glauca* Pallas. Arctic-alpine situations: Alaska—B.C.—Mont.; e Asia. *Subalp.*—*Alp.* JI—Au.

2. *D. Romanzovii* (Ledeb.) Rydb. Basal leaves many, linear-oblancoaleate to narrowly linear, 3-10 cm. long; stem-leaves linear or linear-oblong, 2-5-5 cm. long; stem 5-10 cm. long; calyx-tube 12-15 mm. long; lobes linear-oblong, obtuse, 5-10 mm. long; corolla yellowish white, tinged with blue and purple-dotted; lobes triangular, acute; plaits entire, with a very broadly triangular summit. *G. frigida* A. Gray, not Haenke. *G. Romanzovii* Ledeb. Arctic-alpine situations: Alaska—Utah—Colo.—Mont. *Mont.*—*Alp.* JI—Au.

3. *D. Andrewsii* (Griseb.) Small. Stem glabrous, simple, 3-6 dm. high, leafy; leaves lanceolate or ovate-lanceolate, 7-15 cm. long, 3-7-ribbed; flowers in terminal clusters and in the axils of the uppermost leaves; calyx-tube 8-12 mm. long; lobes lanceolate or ovate, ciliolate, spreading; corolla broadly clavate, bluish or white, closed; lobes obsolete, rounded; lobes of the plaits rounded, erose, yellowish. *G. Andrewsii* Griseb. Wet meadows and among bushes: Que.—Ga.—Nev.—Neb.—S.D. *Plain.* Au—O.

4. *D. obtusiloba* Rydb. Stems erect or ascending, about 1 dm. high; internodes short, equalling or a little longer than the leaves; leaves very broadly ovate, 3-5-ribbed, usually acute at the apex and subcordate at the base; calyx-tube 5-6 mm. long; lobes broadly oval, rounded at the apex, often overlapping, about 8 mm. long; corolla dark blue, about 3.5 cm. long; lobes of the plaits about half as long as the corolla-lobes. High mountains: Mont. *Submont.* JI—Au.

5. *D. calycosa* (Griseb.) Rydb. Stems 1-3 dm. high, ascending, erect or decumbent; internodes short, about equalling the leaves; leaves 2-3 cm. long, 3-5-ribbed; flowers usually solitary, sessile, and subtended by the upper broad leaves; calyx-lobes ovate, foliaceous, 7-10 mm. long, obtuse; corolla dark blue, or (in var. *xantha* A. Nels.) yellow, green-spotted, 3-4 cm. long; lobes ovate, triangular-acute at the apex; plaits with a lanceolate, more or less lacinate, acuminate prolongation, half as long as the corolla-lobes or longer. *G. calycosa* Griseb. High mountains: Wash.—Calif.—w Wyo. *Mont.*—*Subalp.* Jl-S.

6. *D. monticola* Rydb. Stem about 1 dm. high, erect; internodes usually shorter than the leaves; leaves 3-ribbed; flowers solitary and sessile, subtended by the broad upper leaves; calyx-tube 7-9 mm. long; lobes lance-ovate, 8-10 mm. long; corolla dark blue, about 3 cm. long; lobes of the plaits lanceolate, acuminate, lacinate or toothed, half as long as the corolla-lobes or longer. High mountains: Wash.—Mont.—nw Wyo. *Mont.*—*Subalp.* Au.

7. *D. Parryi* (Engelm.) Rydb. Stems erect or ascending, many-leaved, 1-4 dm. high; leaves from linear-lanceolate to ovate, fleshy and somewhat glaucous, 1.5-4 cm. long; flowers 1-6 at the summit of the stem; calyx-tube 10-15 mm. long, white and scarious; lobes linear or lanceolate, 4-8 mm. long; corolla bright blue, about 4 cm. long; lobes obovate, acute; lobes of the plaits ovate, usually 2-cleft, toothed, two-thirds as long as the corolla-lobes. *G. Parryi* Engelm. *G. bracteosa* Greene. High mountains: Wyo.—Colo.—Utah. *Mont.*—*Subalp.* Jl-S.

8. *D. oregana* (Engelm.) Rydb. Stems erect, 3-4 dm. high, leafy; leaves 2-4 cm. long, 3-5-ribbed, cutish or obtuse, rounded to acute at the base; flowers short-pedicelled in the upper axils; calyx-tube about 1 cm. long; lobes 5-8 mm. long; corolla purple, 3-3.5 cm. long; lobes ovate, acute; lobes of the plaits triangular, with 2 acuminate lobes. *G. oregana* Engelm. Meadows: Wash.—Calif.—Mont. *Submont.* Jl-S.

9. *D. affinis* (Griseb.) Rydb. Stems 1-3 dm. high, leafy; leaves 1.5-3 cm. long; calyx-tube 5-7 mm. long; lobes 2-10 mm. long, acute; corolla blue or purple, 2.5-3 cm. long; lobes ovate, acute; lobes of the plaits ovate, 2-cleft, acuminate, lacinate, two-thirds as long as the corolla-lobe. *G. affinis* Griseb. Mountains and hills: B.C.—(? Calif.)—Colo.—Sask. *Mont.*—*Subalp.* Au-S.

10. *D. Forwoodii* (A. Gray) Rydb. Closely related to *D. affinis*; stem 1-3 dm. high, leafy; leaves 1.5-3 cm. long, rather thick; flowers short-pedicelled in the upper axils, forming a dense spike-like inflorescence; calyx-tube 5-8 mm. long, usually purplish; corolla blue or purple, about 3 cm. long; lobes obovate, acute; lobes of the plaits 2-cleft, lanceolate, acuminate, a little shorter than the corolla-lobes. *G. Forwoodii* A. Gray. Hills and mountains: Alta.—Colo.—Ida. *Submont.*—*Mont.* Jl-Au.

11. *D. Bigelovii* (A. Gray) Rydb. Stem 2-3 dm. high, erect; lower leaves oblong, the upper linear or lance-linear; floral leaves and calyx-lobes glandular-ciliolate; flowers short-pedicelled in the upper axils, forming a many-flowered spike; calyx-tube 5-6 mm. long; lobes linear-subulate, 5-7 mm. long; corolla cylindro-funnelform, 2-2.5 cm. long; lobes acute; lobes of the plaits triangular, 2-cleft, acute, half as long as the corolla-lobes. *G. Bigelovii* A. Gray. Mountains: Colo.—N.M.—Ariz. *Submont.* Au-O.

12. *D. interrupta* (Greene) Rydb. Stem 3-4 dm. high; lower leaves ovate or oblong, 1-2 cm. long, the upper narrowly linear, 2-4 cm. long; lower flowers on peduncles 1-2 cm. long; calyx-tube 5-6 mm. long; lobes linear or subulate, 2.5-4 mm. long; corolla open-funnelform, 2.5-3 cm. long; lobes obovate; lobes of the plaits 2-cleft; divisions lanceolate, acute, two-thirds as long as the corolla-lobes. *G. interrupta* Greene. Mountains: Wash.—Ore.—Colo.—Sask. *Submont.* Au-S.

13. *D. puberula* (Michx.) Small. Stem strict, erect, 3-5 dm. high, more or less scabrous, leafy; leaves lanceolate, firm, scabrous-puberulent on the margins and midrib, paler beneath, 3-5 cm. long; flowers subsessile, forming a dense spike; calyx-tube not scarious, about 1 cm. long; lobes subulate, 8-12 mm. long,

1. *A. lanuginosa* (Nutt.) DC. Stem erect, 1-4 dm. high; leaves oblong or elliptic, short-petioled, 3-10 cm. long; corolla greenish; lobes oblong, about 5 mm. long; hood purplish, oblong, with an auricle or fold on the ventral margins. Prairies: Ill.—Minn.—Mont.—Wyo. Je—Au.

2. *A. viridiflora* (Raf.) Eat. Stem 2-6 dm. high, often decumbent; leaves oval or oblong and obtuse or retuse or acute, or elongated lanceolate and acuminate (var. *Ivesii* Britton), or narrowly linear (var. *linearis* A. Gray), becoming leathery, with undulate margins; umbels sessile or nearly so, many-flowered; corolla-lobes oblong-lanceolate, about 5 mm. long; hood dull purple or at least tinged with purple, lance-oblong, entire except for the small infolded auricles at the base. Dry or sandy soil: Mass.—Fla.—N.M.—Mont. Plain—Submont. Je—Jl.

3. *A. auriculata* Engelm. Stem 2-8 dm. high, mostly solitary; leaves alternate, scattered, narrowly linear, 5-15 cm. long, with scabrous, often revolute margins; corolla-lobes greenish, about 4 mm. long; hood yellowish, with purplish keel, erect, emarginate or truncate, the involute sides with broad auricles at the base. Plains and prairies: Neb.—Utah—N.M.—Tex. Plain—Submont. Je—Au.

4. *A. angustifolia* (Nutt.) Dec. Stem several from a thick rootstock, 3-6 dm. high, puberulent or glabrate in age, leaves narrowly linear, 5-12 cm. long, revolute-margined; umbels subsessile; corolla-lobes 5 mm. long, oblong, greenish; hood white, erect, as high as the anthers, laterally compressed, 3-dentate at the apex, the inner margins with an erose truncate lobe. *Asclepias stenophylla* A. Gray. Dry plains: S.D.—Colo.—Tex.—Mo. Plain. Je—Au.

4. ASCLEPIAS (Tourn.) L. MILKWEED, SILKWEED, BUTTERFLY-WEED.

Perennial herbs, with deep taproots, sometimes woody at the base. Leaves opposite, alternate, or whorled. Flowers perfect, regular, in axillary or terminal umbels. Calyx small, usually with small glands at the base of the 5 lobes. Corolla rotate, deeply 5-cleft; lobes valvate-convolute in bud, reflexed in anthesis. Hoods of the crown involute, arising from the base of the corolla-lobes or on a short column, concave, hooded, bearing within a horn- or tooth-like projection, and sometimes additional processes between the anthers. Follicles fusiform, naked or with soft processes or warty. Seeds mostly with a coma.

Plant more or less hirsute; hoods orange; leaves mostly alternate; juice not milky.

Plant not hirsute; hoods greenish, purplish, yellowish, or white, leaves mostly opposite or verticillate, juice milky.

Leaves orbicular to linear-lanceolate, opposite (except No. 14).

Follicles with soft spinulose processes, tomentose; leaves large and broad, tomentose, transversely veined, oval or ovate.

Hoods oblong-ovate, obtuse, slightly exceeding the stamens.

2. *A. syriaca*.

Hoods lanceolate, produced, about three times as long as the stamens.

3. *A. speciosa*.

Follicles without processes.

Flowers very large; petals over 1 cm. long, column none; corolla spherical in outline, horns included in the hoods, leaves almost orbicular, subcordate at the base.

4. *A. cryptoceras*.

Flowers middle-sized or small; petals much less than 1 cm. long, column usually present and horns exserted.

Leaves broadly oval or rectangular-oval or nearly orbicular, obtuse or retuse at both ends, umbels sessile.

Plant puberulent when young, glabrate in age; column very short.

5. *A. latifolia*.

Plant tomentulose; column half as long as the anthers.

6. *A. arenaria*.

Leaves ovate or lanceolate, or rarely oval, acute.

Leaves ovate or ovate-lanceolate, more or less tomentose, at least when young.

Hoods truncate, slightly longer than the anthers; leaves sessile, with rounded or subcordate bases.

7. *A. erosa*.

Hoods ovate-oblong to lanceolate, much exceeding the stamens, leaves petioled.

Corolla yellowish; hoods with a tooth on each margin, not auricled or gibbous at the base; peduncles shorter than the pedicels.

8. *A. ovalifolia*.

- Corolla purple; hoods without teeth; peduncles longer than the pedicels.
 Hoods not auricled or gibbous at the base; leaves permanently tomentose, at least beneath. 9. *A. curripes*.
 Hoods with two gibbosities at the base; leaves puberulent when young, glabrous in age 10. *A. Hallii*.
 Leaves linear-lanceolate, hoods truncate, little if at all longer than the anthers
 Column short; leaves pale.
 Plant more or less tomentose or puberulent, at least when young
 Hoods shorter than the anthers; corolla purple, leaves in age glabrate or nearly so.
 Hoods about half as long as the anthers; umbels peduncled 11. *A. brachystephana*.
 Hoods only slightly shorter than the anthers; umbel subsessile 12. *A. uncinatis*.
 Hoods longer than the anthers; corolla purplish outside, green within; leaves permanently tomentose 13. *A. macrosperma*.
 Plant glabrous; corolla greenish white; hoods white. 14. *A. labriformis*.
 Column more than half as long as the anthers, corolla purple 15. *A. incarnata*.
 Leaves narrowly linear, verticillate or scattered
 Corolla usually ash-colored, leaves 4-8 mm. wide. 16. *A. mexicana*
 Corolla greenish and white; leaves 1-3 mm. wide
 Plant tall, 4-6 dm. high, from a rootstock; leaves verticillate.
 Hoods entire 17. *A. verticillata*
 Hoods dorsally hastate-sagittate 18. *A. gallodes*
 Plant low, 1-2 dm. high, bushy, from a ligneous base; leaves scattered, crowded. 19. *A. pumila*.

1. *A. tuberosa* L. Stem 3-6 dm. high, coarsely hirsute, very leafy; leaves usually alternate, short-petioled or subsessile, lance-linear or lance-oblong, subcordate to acute at the base, 5-10 cm. long, with revolute margins; corolla-lobes linear-oblong, obtuse, 6-8 mm. long, greenish or reddish orange; column about 1 mm. long; hoods linear-oblong or linear-lanceolate, bright orange or yellow, 5-6 mm. long; follicles 7-10 cm. long, minutely pubescent. Dry fields and meadows: Ont.—Fla.—Tex.—Ariz.—Minn. *Plain*. Je-S.

2. *A. syriaca* L. Stem 5-15 dm. high, canescent or in age glabrate; leaf-blades elliptic to lance-oblong, 1-1.5 dm. long, 4-11 cm. wide, rounded, truncate or acute at the base, obtuse or mucronate at the apex, green and glabrous or nearly so above, tomentulose beneath; corolla-lobes dull greenish purple, 8 mm. long, more or less pubescent; column less than 1 mm. long; hoods whitish or greenish purple; follicles 7-9 cm. long, lance-ovate, tomentose. *A. Cornuti* Dec. Fields and waste places: N.B.—Ga.—Kans.—Sask. *Plain*. Je-S.

3. *A. speciosa* Torr. Stem tall, 1-2 m. high, finely canescent-tomentose; leaves oval, subcordate at the base, thick; corolla greenish purple; lobes oblong or ovate-oblong, 9-13 mm. long; column short or none; hoods lanceolate, 11-15 mm. long, with two blunt teeth below; follicles 7-10 cm. long, with numerous processes. Valleys: Sask.—Minn.—Kans.—Calif.—B.C. *Plain*—*Submont.* My-Jl.

4. *A. cryptoceras* S. Wats. Stems several from a woody thick root, decumbent, 1-2 dm. high, glabrous; leaves very short-petioled or subsessile; blades ovate-orbicular, 4-6 cm. long, glabrous and glaucous, strongly veined, subcordate at the base; corolla-lobes greenish yellow, ovate, acute, about 1 cm. long; column none; hoods flesh-colored, saccate-ovate, about 7 mm. long, rounded on the sides; follicles ovate. Sandy plains, rocky hills, and clay benches: Wyo.—Colo.—Calif.—Ore. *Plain*—*Submont.* My-Je.

5. *A. latifolia* (Torr.) Raf. Stem simple, stout, 3-8 dm. high, minutely puberulent when young; leaves sessile or short-petioled; blades rounded-oval, mucronate and often emarginate at the apex, cordate or subcordate at the base, 7-15 cm. long, minutely puberulent; corolla-lobes ovate, 7-10 mm. long, greenish; column thick, very short; hood truncate; follicles ovoid, 6 cm. long, glabrate. *A. Jamesii* Torr. Dry plains: Neb.—Tex.—Ariz.—Utah. *Plain*. Jl-Au.

6. *A. arenaria* Torr. Stem decumbent or ascending, tomentose, 3-6 dm. long; leaf-blades rectangular-oval or obovate, truncate or retuse and often muc-

olate, becoming 7-8 mm. long, acute, pubescent; corolla bluish white, 7-8 mm. broad. *Ellisia Nyclelea* L. Alluvial soil and shady places: N.J.—N.C.—Colo.—Ida.—Alta. *Plain—Mont.*

3. EUCRÝPTA Nutt.

Low annual herbs. Leaves membranous, pinnately parted. Flowers perfect, regular, in geminate or panicle racemes. Calyx deeply 5-cleft. Corolla almost rotate, bright blue with yellow center, with two plicate, transverse appendages, much higher up than the stamens. Capsule globose, loculicidal. Seeds few or many, cylindraceous or oblong, incurved, transversely rugose and tuberculate, or deeply flavose.

Seeds cylindric, transversely rugose and tubercled
Seeds oblong or oval, deeply flavose.

1. *E. micrantha*.
2. *E. pinetorum*.

1. *E. micrantha* (Torr.) Heller. Weak annual; stem branched, 1-2 dm. long, minutely glandular-pilose; leaves thin, pinnately parted into 5-9 obovate or oblong, obtuse lobes; racemes loose; calyx-lobes obovate or broadly spatulate, 2.5-3 mm. long; corolla bright blue, with yellowish tube, according to Heller creamy, a little exceeding the sepals; capsule globular, 20-24-seeded. *Phacelia micrantha* Torr. Dry places: N.M.—Utah—Calif. *Son.* Mr—My.

2. *E. pinetorum* (M. E. Jones) Rydb. Weak annual; stem erect, branched, 5-20 cm. high, glandular-puberulent; lower leaves pinnatifid, with oblong divisions, the upper entire or 3-lobed; racemes few-flowered; calyx-lobes lanceolate or ovate, acutish, longer than the white or blue corolla. *Phacelia pinetorum* M. E. Jones. Pine woods: Utah. *Submont.* Je.

3. NEMÓPHILA Nutt. BABY-BLUE-EYES.

Diffuse annual herbs. Leaves alternate or opposite, pinnately lobed or pinnatifid. Flowers perfect, solitary on axillary or terminal pedicels. Calyx not accrescent, 5-lobed, with a spreading or reflexed linear appendage in each sinus. Corolla campanulate to nearly rotate, with 10 appendages within; lobes convolute. Stamens 5, included, with short filaments. Ovary 1-celled; styles 2-cleft; ovules 2-12 on each fleshy placenta, which is attached to the top and bottom of the ovary. Capsule two-valved. Seeds usually 1-4.

Corolla 12-18 mm. long.
Corolla 2-3 mm. long.

1. *N. Kirtleyi*.

Appendages of the corolla present.

Appendages of the corolla narrow, acuminate; seeds deeply pitted

Appendages of the corolla broad, cuneate; seeds smooth

Appendages of the corolla wanting.

2. *N. inconspicua*.
3. *N. breviflora*.
4. *N. explicata*.

1. *N. Kirtleyi* Henders. Stem 5-20 cm. high, short-hispid; lower leaves opposite, the upper alternate; blades ovate in outline, irregularly 5-parted; lobes oblong, 3-lobed or strongly dentate; appendages of the calyx ovate, less than one-third the length of the lobes; calyx-lobes lanceolate, in fruit nearly as long as the corolla; corolla with violet border and white center, greenish-spotted; internal appendages half fan-shaped, lobed and fimbriate; seeds deeply pitted. Loose soil. Ida.—Ore. *Son.* Jl.

2. *N. inconspicua* Henders. Leaves pinnately 5-lobed or 5-parted; blades rounded to ovate in outline; lobes rounded or obtusely triangular; appendages of the calyx ovate, one-fourth as long as the sepals; corolla equalling the calyx or slightly shorter, white, 2.5 mm. long; appendages narrow, acuminate or lacinate. Loose moist soil: Ida. *Son.* Jl.

3. *N. breviflora* A. Gray. Stem branched, diffuse, 1-3 dm. high; leaves often all alternate, pinnately 3-5-parted; divisions oblong-lanceolate, acute, entire, 6-18 mm. long; appendages of the calyx nearly half as long as the sepals; corolla whitish or tinged with violet, shorter than the calyx; internal appendages cuneate, broad, fimbriate. Rich soil, hillsides, and cañons: Mont.—Colo.—Ore.—B.C. *Submont.* My—Jl.

4. *N. explicata* Nels & Macbr. Stem branching from the base, 7-15 cm. long, spreading; leaves obovate or orbicular in outline, crenately 3-5-lobed, 1-2

funneliform or salver-shaped, blue; lobes 5, imbricate. Stamens 5, included; filaments irregularly inserted in the corolla-tube. Ovary 1-celled, or sometimes imperfectly 2-celled; styles distinct; ovules numerous on each placenta. Capsule subglobose or oblong, 2-valved. Seeds rugose. [*Nama* L., in part.]

Diffuse; corolla more than twice as long as the calyx.
Erect; corolla shorter than the calyx.

1. *M. demissum*.
2. *M. angustifolium*.

1. ***M. demissum*** (A. Gray) Kuntze. Diffuse annual; stem branched at the base, 5–10 cm. high, hirsutulous; leaf-blades linear-spatulate, more or less tapering into a petiole; flowers subsessile in the axils; sepals narrowly linear, 5–7 mm. long; corolla 8–10 mm. long, purple. *Nama demissum* A. Gray. Desert regions: Wash.—Utah—Ariz.—Calif. *Son.* Ap–Jl.

2. ***M. angustifolium*** (A. Gray) Kuntze. Annual; stem erect, minutely glandular-puberulent, 1–3 dm. high; leaves narrow, linear or nearly so, 1–3 cm. long; flowers subsessile in the forks; calyx-lobes narrowly linear or linear-spatulate, 4–5 mm. long, in fruit even 10 mm. long, corolla about 2 mm. long. *Nama dichotomum angustifolium* A. Gray. Plains and prairies: Tex.—Colo.—N.M.; Mex. *Son.* Je–O.

12. **CONANTHUS** S. Wats.

Small dichotomously branched winter annuals. Leaves alternate, linear-spatulate, entire. Flowers solitary in the forks. Calyx-lobes 5, narrow, similar. Corolla funneliform, deciduous, not appendaged. Stamens unequally inserted in the tube of the corolla. Styles united to near the apex; stigmas capitate; ovules about 10 on each placenta. Capsule loculicidal. Seeds smooth.

1. ***C. aretioides*** (Hook.) S. Wats. Depressed winter annual; stem 5–10 cm. long, repeatedly forked, hirsute-hispid; leaves spatulate-linear; flowers sessile in the forks; calyx-lobes filiform-linear, hispid with long white hairs; corolla 10–15 mm. long, purple, funneliform. Sandy or dry plains: Ore.—Wyo.—N.M.—Calif. *Son.* My–Je.

13. **TRICARDIA** Torr.

Perennial caulescent herbs, branched from the base. Leaves alternate, entire. Flowers perfect, regular, racemose. Sepals only slightly united, very dissimilar; the three outer much larger, and cordate, becoming scarious and finely reticulate-veiny, the inner two linear. Corolla broadly campanulate, deciduous, the 10 internal appendages free and rather distant from the filaments. Stamens equally inserted on the base of the corolla. Ovary 2-celled by the intrusion of the placentae. Style 2-cleft; ovules 4 on each placenta. Capsule loculicidal. Seeds roughened.

1. ***T. Watsoni*** Torr. Perennial; stem branched from the base, 1–2 dm. high, villous with long hairs or more glabrate in age, leaf-blades spatulate or oblanceolate, 3–5 cm. long; larger sepals cordate in fruit, becoming 1.5 cm. or more broad and long; corolla purplish, about 6 mm. wide, moderately 5-lobed; stamens included. Arid regions: Nev.—s Utah—Calif. Ap–Je.

FAMILY 111. **EHRETIACEAE**. EHRETIA FAMILY.

Undershrubs, shrubs, or trees, rarely herbs. Leaves mainly alternate, without stipules; blades simple and entire. Flowers perfect, regular, in compound cymes. Calyx of 5 or fewer, partially united sepals. Corolla of 5, rarely 4 or 6, more or less united petals, deciduous, with spreading lobes. Stamens 4–6, adnate to the base of the corolla-tube; filaments often united at the base; anthers introrse. Gynoecium of 2–4 united carpels; ovary 2–4-celled, or 1-celled, some of the partitions being imperfect; styles 2, distinct or partially united, or 4, united in pairs; ovules 1 or 2 in each cavity. Fruit drupaceous, with a 4-celled, but 1-seeded stone, or 2 two-seeded or 4 one-seeded stones.

Corolla not appendaged, stamens unequally inserted; nutlets rough-granulate, ventrally united.

Corolla appendaged, stamens equally inserted; nutlets smooth and shining, united only at the center

1. EDDYA.

2. TRIQUILIOPSIS.

1. EDDYA Torr.

Low suffruticose plants. Leaves alternate, fascicled, rigid, in age strongly revolute. Flowers perfect, regular, solitary in the forks. Calyx-lobes narrow, linear. Corolla not appendaged. Stamens unequally inserted. Fruit deeply 4-lobed, the mature nutlets rounded, ventrally united, thin-walled, rough-granulate. Embryo straight.

1. *E. hispidissima* Torr. Stem diffusely branched, procumbent, 1-3 dm. high; leaves fascicled, rigid, lanceolate or linear, hispid, 5-10 mm. long, margins at last strongly revolute, flowers scattered, calyx-lobes linear, resembling the leaves; corolla 5-6 mm. long. *Coldenia hispidissima* A. Gray. Dry hills: w Tex.—s Utah—Nev.—Ariz. Son. Je-Jl.

2. TRIQUILIOPSIS (A. Gray) Heller.

Annual or perennial herbs, dichotomously branched. Leaves alternate, petioled, veiny. Flowers perfect, regular, clustered in the forks. Calyx-lobes linear, hispid. Corolla salver-shaped, appendaged within; stamens equally inserted. Fruit deeply 4-lobed; nutlets rounded, smooth and shining, united only at the center. Cotyledons 4-parted around the cotyledons.

Annual, canescent and hirsute, leaf-blades rhombic or rotund, corolla pink or white

1. *T. Nuttallii*.

Perennial, often suffruticose at the base, merely canescent, leaf-blades obovate or ovate, corolla bluish

2. *T. Palmeri*

1. *T. Nuttallii* (Hook.) Heller. Prostrate annual; stem divergently dichotomously branched, canescent; leaves petioled; blades rhombic or rounded, 4-8 mm long, with 5-7 strong veins below, canescent on both sides, revolute-margined; flowers clustered in the axils, corolla white or pink, 3-4 mm. long. *Coldenia Nuttallii* Hook. Arid plains: Wash.—Wyo.—Ariz.—Calif. My—Au.

2. *T. Palmeri* (A. Gray) Rydb. Perennial, suffruticose at the base, 1-3 dm. high, diffusely branched, leaf-blades obovate or ovate, with 6 pairs of strong veins, unpressed on the upper surface, canescent, about 5 mm. long; calyx-lobes lanceolate, half as long as the bluish corolla; nutlets globose, only one or two maturing. *Coldenia Palmeri* A. Gray. Sandhills: Ariz.—s Utah—s Calif. L. Son. Ja—My.

FAMILY 112. HELIOTROPACEAE. HELIOTROPE FAMILY.

Herbs, shrubs, or vines. Leaves alternate, without stipules, usually entire-margined. Flowers perfect, regular, mainly in scorpioid racemes or spikes, rarely axillary. Calyx of 5 slightly united sepals. Corolla of 5 united petals, funnelform, salver-shaped, or campanulate. Stamens 5, wholly adnate or nearly so to the corolla-tube. Gynoecium of 2-4 united carpels; ovary 2-4-celled, often 4-lobed; styles united; stigmas annular, surpassed by a 2-lobed appendage; ovules pendulous. Fruit dry, separating into 2 or 4 one-seeded nutlets, drupaceous.

Cone of the stigma not setose, flowers in terminal scorpioid spikes or racemes

1. HELIOTROPIMUM.

Cone of the stigma penicillate-setose, flowers axillary to leaf-like bracts

2. EUPLOCA.

1. HELIOTROPIMUM L. HELIOTROPE.

Annual or perennial herbs, or in warmer climates shrubs. Leaves alternate, or rarely opposite, pubescent. Flowers perfect, regular, usually in terminal scorpioid racemes or spikes. Calyx-lobes 5, narrow. Corolla salver-shaped; tube cylindric, usually naked in the throat; lobes 5, induplicate or imbricate. Stamens 5, included; filaments short; anther-sacs sometimes appendaged at the

3. *P. Kingii* A. Gray. Stem 2-3 dm. high, canescent-hirsute; basal leaves spatulate, densely hirsute, the cauline oblong or lanceolate; inflorescence branched; corolla white, 6-8 mm broad; fruiting calyx 4-6 mm. long; lobes lance-linear; nutlets roughened with scattered acute papillae. *Sonnea Kingii* Greene. Arid valleys: Nev.—Ida.—(? Utah). *Son.*

9. *EREMOCARYA* Greene.

Dichotomously branched annuals. Leaves alternate, linear, entire, hirsute-canescens. Flowers perfect, regular, biserial in dense leafy racemes. Calyx wholly persistent, 5-cleft; lobes linear-oblong, obtuse, short-hirsute, not hispid. Corolla minute, salver-shaped, white; throat obscurely appendaged. Style thickened. Nutlets attached by a simple groove for their whole length to the columnar receptacle.

Nutlets smooth and shining
Nutlets finely muricate, dull.

1. *E. micrantha*.
2. *E. muricata*.

1. *E. micrantha* (Torr.) Greene. Stem slender, branched from the base, diffuse, 5-15 cm. high, strigose; leaves linear, 4-8 mm. long, hispid; corolla white, barely 2 mm. long; nutlets oblong-ovate, acute. *Eritrichium micranthum* Torr. Dry plains: w Tex—s Utah—s Calif. *L. Son.* *Je.*

2. *E. muricata* Rydb. Stem slender, branched throughout, with ascending branches, strigose; leaves linear, 2-5 mm. long, hispidulous; corolla white, 1 mm. long; limb scarcely 0.5 mm. wide; nutlets lanceolate in outline. Dry plains and hills: s Utah—Ariz. *L. Son.* *Ap-My.*

10. *OREOCARYA* Greene.

Perennial or at least biennials, with taproots or short rootstocks. Leaves alternate, the earlier in basal rosettes, more or less hispid. Calyx wholly persistent, 5-cleft; the lobes ascending or spreading in fruit. Corolla salverform, white or yellowish; tube often elongate, annulate within near the base; throat closed by conspicuous fornicees, limb 5-lobed. Inflorescence thyrsoid or paniculate, leafy-bracted. Nutlets triangular, sometimes somewhat wing-margined, attached for the larger part of their length by a slender suture on the inner angle to a subulate or columnar receptacle

Corolla-tube not exserted.

Fruit depressed, nutlets smooth, at the margins separated by an open space; caulescent caespitose perennials

Leaves canescent

Nutlets all maturing.

Leaves appressed-canescens, not hispid, corolla 5-7 mm wide

Leaves with the fine pubescence intermixed with hispid hairs on the lower surface, corolla less than 5 mm. wide

Plant low, grayish, not yellowish hispid above, racemes short, 2-ranked.

Plant tall, yellowish hispid above, racemes in fruit elongate, 1-ranked.

Nutlets only one maturing, three abortive.

Leaves green, having scattered short hairs with pustulate bases above, glabrous beneath

Fruit conical or ovoid, nutlets touching each other.

Floral leaves long, many times longer than the flower-clusters, inflorescence spike-like, biennials or short-lived perennials.

Nutlets transversely rugose.

Nutlets smooth

Floral leaves comparatively short, little if at all surpassing the flower-clusters.

Nutlets rough

Nutlets decidedly wing-margined.

Branches of the inflorescence appressed, erect, in fruit elongate, nutlets merely muricate on the back.

Branches of the inflorescence spreading, nutlets rugose as well as muricate on the back.

Nutlets acute-margined, not winged

Calyx-lobes ovate-lanceolate, only slightly exceeding the mature nutlets, inflorescence paniculate, with rather few branches; caulescent perennials, often caespitose.

Corolla 7-8 mm. broad; nutlets muricate and cross-ribbed, but not honeycomb-crested.

9. *O. elata*.

6. *O. virgata*.

7. *O. spicata*.

8. *O. setosissima*.

11. *O. virginensis*.

3. *O. multifida*.

4. *O. disticha*.

5. *O. pustulosa*.

2. *O. suffrutcosa*.

1. *O. cinerea*.

- Corolla 4-5 mm. broad, nutlets honeycomb-crested.
10. *O. Bakeri*.
 Calyx-lobes lanceolate to linear, much exceeding the nutlets; inflorescence thyrsoid.
 Inflorescence a broad, open, round-topped thyrus; branches usually again branched.
 Plant tall, 2 dm. high or more, nutlets with acute backs and sharply acute margins, tubercles united into more or less distinct cross-ridges, biennials, with taproots.
 Nutlets wing-margined, with the strong, rather regular cross-ridges uniting on the back 11 *O. virginensis*
 Nutlets merely acute-angled, weakly irregularly cross-ridged. 12 *O. thyrsiflora*
- Plant low, caespitose perennials, 1-2 dm. high; nutlets with rounded backs; murications united into star-shaped tubercles. 13 *O. aperta*
- Inflorescence, at least in flowers, narrow, almost spike-like, if more open, the branches simple
- Plants green, very hispid, only the basal leaves canescent; bristles with conspicuous pustulate bases, much longer than the short strigose or tomentose pubescence
- Leaves linear or narrowly linear-lanceolate, plant 1-2 dm. high, very slender 14. *O. Macounii*
- Leaves, at least the basal ones, broadly oblanceolate or spatulate
- Corolla 7-10 mm. broad, nutlets ovate, more than half as broad as long
- Leaves obtuse, inflorescence dense.
- Basal leaves broadly spatulate, usually canescent; stem 1-3 dm. high. 15 *O. glomerata*.
- Basal leaves oblanceolate, green; stem usually 3-4 dm. high 16 *O. affinis*.
- Leaves acute, strongly hirsute-ciliate; inflorescence not very dense 17 *O. spiculifera*
- Corolla 5-7 mm. broad; nutlets lanceolate, less than half as broad as long, basal leaves oblanceolate, somewhat canescent; plant 1-3 dm. high.
18. *O. perennis*
- Plant canescent, at least the basal leaves with inconspicuous bristles scarcely longer than the other pubescence
- Plant stout, 2-4 dm. high, rather simple; corolla 7-10 mm. broad. 19 *O. argentea*.
- Plant low, less than 2 dm. high, densely caespitose.
- Basal leaves narrowly linear-oblanceolate, glossy, closely appressed-canescant, nutlets mammillate-papillose 20 *O. cana*
- Basal leaves spatulate, white or yellow, scarcely glossy, at least when mature
- Nutlets 1 or 2, acuminate with a blunt apex; calyx-lobes linear-subulate 21 *O. nana*
- Nutlets 4, merely acute, calyx-lobes lanceolate
- Nutlets more or less rugulose; tubercles more or less confluent
- Inflorescence in fruit rather open, corolla-tube slightly exserted 22 *O. echinoides*.
- Inflorescence congested; corolla-tube not exserted.
- Corolla 7-9 mm. broad 23 *O. sericea*
- Corolla 4-6 mm. broad.
- Leaves tomentose and hispid; nutlets tuberculose-rugulose 24 *O. depressa*
- Leaves strigillose and hispid; nutlets sinuately and finely rugulose 25. *O. caespitosa*.
- Nutlets muricate
- Inflorescence narrow; plant not more than 1 dm. high
- Leaves strigillose and hispid.
- Leaves subtomentose and hispid. 26 *O. Shantzii*.
- Inflorescence open, plant 1-2 dm. high. 27. *O. dolosa*.
- 28 *O. commixta*.
29. *O. salmonensis*.
- Nutlets smooth.
- Corolla-tube long-exserted; caespitose perennial, rarely biennial.
- Corolla white.
- Nutlets rough.
- Nutlets more or less distinctly rugose, with irregular cross-ridges, as well as muricate.

- Fruit depressed-globose, nutlets incurved on the margins and separated by open spaces. 30 *O. paradoxa*.
- Fruit ovoid-conic, nutlets touching
- Ridges of the nutlets honeycomb-crested, inflorescence narrow; leaves canescent and hispid 31 *O. euphorus*.
- Ridges of the nutlets neither much interlacing nor crested.
- Inflorescence, at least in fruit, open, with elongate branches
- Corolla 15-18 mm long, calyx enlarging and becoming 15-18 mm long in fruit 32 *O. longiflora*
- Corolla 12-15 mm long, calyx scarcely enlarging, in fruit less than 1 cm long. 33 *O. Wetherillii*.
- Inflorescence narrow, stem slender.
- Basal leaves spatulate
- Corolla 12-14 mm long, much exceeding the calyx 34 *O. cristata*
- Corolla slightly exceeding the calyx 22 *O. echinoides*.
- Basal leaves linear-oblancoelate, corolla slightly exceeding the calyx. 35 *O. tenuis*
- Nutlets finely muricate, at least the inflorescence with yellowish hairs.
- Plant low, 1-2 dm. high, basal leaves 2-3 cm long, 3-7 mm wide.
- Corolla about 1 cm long, pure white, nutlets muricate on the back 36 *O. fulvocanescens*.
- Corolla 12-15 mm long, often with a yellow eye, nutlets roughly papillose 38 *O. flavoculata*
- Plant 2-3 dm high, basal leaves 4-10 cm long, 7-15 mm wide 37 *O. nitida*.
- Nutlets smooth
- Fruit not depressed, stem-leaves linear or linear-lanceolate
- Stem-leaves linear; nutlets brownish, obtuse, slightly ridged on the back. 39 *O. flava*
- Stem-leaves linear-lanceolate, nutlets ivory-white, acute, flat on the back. 40 *O. leucophaea*.
- Fruit depressed, acutely margined 41 *O. alata*
- Corolla yellow, or with a yellow throat 38 *O. flavoculata*.
- Basal leaves spatulate or oblanceolate, corolla usually white with yellow throat, nutlets papillose 39 *O. flava*.
- Basal leaves narrowly linear-oblancoelate, corolla yellow; nutlets smooth

1. *O. cinerea* Greene. Stems 1-3 dm high, cinereous-strigose; leaves elongate, linear-oblancoelate or linear, silvery-cinereous, with appressed hairs; calyx-lobes broadly lanceolate; corolla 8-9 mm long, 5-7 mm broad; nutlets light gray, smooth. Arid plains: Colo.—N.M. *Submont.* My-Jl.

2. *O. suffruticosa* (Torr.) Greene. Stems 1-3 dm. high, decumbent or ascending at the base, cinereous and hirsute; leaves linear-oblancoelate or linear, 3-10 cm. long; calyx-lobes ovate-lanceolate, corolla 5-6 mm. long; nutlets more or less tubercled and white-spotted. *E. Jamesii* Torr. *Krynitzkia Jamesii* A. Gray. Plains and foot-hills: S.D.—Tex.—N.M.—Utah—Wyo. *Plain—Submont.* My-Jl.

3. *O. multicaulis* (Torr.) Greene. Stems stout, 2-4 dm. high; leaves linear-oblancoelate or oblanceolate, 3-10 cm long; corolla 5-6 mm. long; nutlets smooth and shining. *Eriotrachium multicaulis* Torr. Dry plains: Tex.—s Colo.—Ariz. *Son.—Submont.* My-Au.

4. *O. disticha* Eastw. Stems about 3 dm. high, canescent as well as hispid; leaves oblanceolate, 2-4 cm. long, finely canescent-strigose above, appressed-hirsute beneath; racemes few, distichous; calyx-lobes ovate-lanceolate, obtuse, 4 mm long; corolla white, 5 mm. long, and about as wide; nutlets solitary, rounded and arched on the dorsal side, mottled with brown, and slightly papillose. *Mesas: Utah. Son. Jl.*

5. *O. pustulosa* Rydb. Stems 3-5 dm. high, glabrous or nearly so throughout; lower leaves linear-oblancoelate, the upper linear or linear-lanceolate, 3-10 cm. long, green; flowers paniculate; sepals triangular-lanceolate, acute; corolla white; tube not exceeding the calyx; limb 5-6 mm. broad; lobes orbicular; fruit depressed-globose; nutlets mottled with light brown. *Cañons: se Utah. Son. Jl-Au.*

6. *O. virgata* (Porter) Greene. Stem 3-6 dm. high, hispid with yellowish hairs; basal leaves oblanceolate, hirsute and hispid, 3-8 cm. long; stem-leaves linear; corolla 6-7 mm. long and fully as broad; nutlets in age brown or gray;

almost sub-capitate; calyx-lobes subulate, pilose-hirsute with yellowish hairs; corolla 4 mm. long, about 1 mm. wide; nutlets ovate, thin-walled, whitish. *K. affinis* A. Gray. Dry places: Wash.—Mont.—Wyo.—Utah—Calif. *Son.—Submont.* My-Jl.

12. *C. lelocarpa* (Fisch. & Mey.) Greene. Annual; stem branched, hispid with ascending hairs, 2-4 dm. high; leaves 2-5 cm. long, hirsute; flower-clusters short and dense; corolla 3 mm. long, about 1 mm. wide; nutlets ovate, glossy, brown, 2 mm. long. *K. leiocarpa* Fisch. & Mey. Hills and sandy places: B.C.—Sask.—Utah—Calif. Mr-Au.

13. *C. confusa* Rydb. Stem rather stout, hispid, branched; leaves 2-5 cm. long, 3-8 mm. wide, coarsely hirsute; calyx-lobes 2 mm. long, lance-subulate, hispid, in fruit 3-4 mm. long; corolla about 3 mm. long; limb scarcely 1 mm. wide; nutlets ovate, 2 mm. long, light-colored, thin-walled, attached by the lower half or two-thirds. River valleys and open woods. B.C.—Mont.—Wyo.—Utah. *Plain—Submont.* Je-Au.

14. *C. gracilis* Osterh. Stem slender, erect, branched, 1-1.5 dm. high, hirsute; leaves few, remote, linear-ob lanceolate, obtuse, 1-2 cm. long, hispid on both sides; spikes rather slender; calyx-lobes 2 mm. long, in fruit 3 mm., hispid with whitish or yellowish hairs; corolla white, 3 mm. long; limb less than 1 mm. wide; nutlet lance-ovate, acuminate, smooth, 2 mm. long. *C. Hulmanii* Nels. & Kenn. Dry places: Colo.—Utah—Ida. *Submont.* Je.

15. *C. grandiflora* Rydb. Stem branched, 2-4 dm. high, hirsute with white hairs; leaves broadly linear, lanceolate or oblong, 3-5 cm. long, 5-10 mm. wide, hirsute; calyx-lobes 3 mm. long, in fruit 5 mm.; corolla 4-5 mm. long; nutlets 2.5 mm. long, shining, smooth, rather thin-walled. River valleys: Wash.—Ida.—Ore. *Son.* Ap-Jl.

16. *C. Torreyana* (A. Gray) Greene. Stem with ascending branches, hirsute; leaves linear, 2-4 cm. long, 2-5 mm. wide, hirsute; calyx 3 mm. long, in fruit 4-5 mm. long, hispid, corolla 4 mm. long; limb 1-2 mm. wide; nutlets about 2 mm. long. *Krynitzkia Torreyana* A. Gray. Dry places: B.C.—Alta.—Colo.—Utah—Calif. *Plain—Mont.* Je-Au.

17. *C. calycosa* (Torr.) Rydb. Stem branched, 2-4 dm. high, hispid; leaves oblong or oblanceolate, 2-4 cm. long, 4-8 mm. wide, hispid; racemes short, but elongating in fruit; calyx-lobes about 3 mm. long, in fruit 6-7 mm., subulate, hispid; corolla 3-4 mm. long, about 1 mm. broad; nutlets 2.5 mm. long. *C. flexuosa* A. Nels. *K. Torreyana calycosa* A. Gray. Stony and sandy places: Mont.—Wyo.—Nev.—Wash. *Submont.* Jl-Au.

18. *C. Watsoni* (A. Gray) Greene. Stem hispidulous, 2-3 dm. high; leaves linear, 2-5 cm. long, hispid; calyx-lobes linear, hispid, 3 mm. long; corolla white, about 4 mm. long; limb 1.5 mm. wide. *K. Watsoni* A. Gray. Hills and mountain slopes: Utah—Wyo.—Colo. *Submont.* Je-Au.

19. *C. Pattersoni* (A. Gray) Greene. Stem branched at the base, 1-2 dm. high, hirsute; leaves 2-5 cm. long, 3-5 mm. wide, hispid; calyx-lobes 2.5 mm. long, in age 4 mm. long, corolla 4 mm. long, 1-1.5 mm. wide; nutlets lanceolate, more or less mottled, attached by its lower half. *K. Pattersoni* A. Gray. Hill-sides and dry places: S.D.—Colo.—Wyo.—Ida. *Submont.—Mont.* My-Jl.

20. *C. Fendleri* (A. Gray) Greene. Stem erect, hirsute with ascending hairs; calyx-lobes linear, 2-3 mm. long, very hispid; corolla 3 mm. long; limb scarcely 1 mm. wide; nutlets ovate, acuminate, mottled, attached by their whole length. *K. Fendleri* A. Gray. River valleys and sandy places: Sask.—Neb.—N.M.—Ariz.—Mont. *Plain—Submont.* Je-Au.

21. *C. ramulosissima* A. Nels. Stem densely and intricately branched, 2-3 dm. high, densely hispid; leaves small, 1-3 cm. long; sepals linear-subulate, 2-2.5 mm. long, in fruit 5-6 mm. long, densely hispid; corolla minute; nutlets lanceolate, acuminate, 2 mm. long. Sandy plains: Wyo. *Plain.* Jl-S.

22. *C. pterocarya* (Torr.) Greene. Stem slender, branched, hirsute, 2-3 dm. high; leaves linear or the lower linear-spatulate, hispid; corolla 4 mm.

long; limb about 1 mm. wide; nutlets ovate, granulate-tubercled on the back, affixed by nearly their whole length; groove narrow, forked at the base with an open areola. *K. pterocarya* A. Gray. Plains and dry places: Wash.—Ida.—w Colo.—N.M.—Calif. *Son.* My-Jl.

23. *C. utahensis* (A. Gray) Greene. Stem branched, 2-3 dm. high, strigose or hirsute below; leaves linear, hispidulous; corolla 3 mm. long; limb 1.5-2 mm. wide; nutlets lance-ovate, minutely papillate on the back; groove gradually opening below into an open areola. *K. utahensis* A. Gray. *Eritrichium holopterum submolle* A. Gray. Dry places: s Utah—s Calif. *Son.* My.

13. AMSINCKIA Lehm. FIDDLE NECK, BUCKTHORN-WEED.

Rough-hispid biennials. Leaves alternate, linear or oblong to ovate, entire. Flowers perfect, regular, in scorpioid spikes, leafy-bracted. Calyx persistent, 5-lobed, or some of the lobes united to near the apex. Corolla salver-shaped, yellow; tube mostly rather clongate; throat in some flowers with and in others without fornicies, in the latter the stamens inserted high up, in the former low down in the tube; limb often plicate in the sinuses. Nutlets bony, more or less triangular, attached below the middle to the pyramidal receptacle.

Leaves all narrowly linear.

Stem-leaves at least lanceolate to ovate

Corolla about 5 mm. long

Corolla 8-10 mm. long

Nutlets with tubercles in more or less distinct rows, but not with tessellate ridges.

Fruiting calyx about 12 mm. long.

Fruiting calyx about 8 mm. long.

Stem-leaves narrowly lanceolate, tubercles distinctly in rows

Stem-leaves broadly lanceolate, tubercles scarcely arranged in rows

Nutlets rugose, with tessellate ridges, interposed with smaller tubercles

Stem-leaves narrowly lanceolate, inflorescence not leafy; sepals linear-lanceolate, free

Stem-leaves broadly lanceolate or oblong, inflorescence leafy, sepals lanceolate, some often united

1. *A. retrorsa*.

2. *A. micrantha*

3. *A. idahoensis*.

4. *A. hispidissima*.

5. *A. Menziesii*.

6. *A. rugosa*

7. *A. tessellata*.

1. *A. retrorsa* Suksd. Stem strict, 3-6 dm. high, hispid with spreading or retrorse hairs; leaves linear, 5-10 cm. long, densely hirsute; sepals linear, 5 mm. long, in fruit 8 mm. long, not covering the nutlets; corolla with indistinct orange spots, 7-8 mm. long; nutlets transversely rugose and with intermediate small tubercles. Dry ground and river valleys: Wash.—Ida. *Son.* Ap-May.

2. *A. micrantha* Suksd. Stem 3-4 dm. high, sparingly and finely hispid; basal leaves oblanceolate or oblong, 3-6 dm. long, sparingly hispid; upper stem-leaves lanceolate; calyx-lobes linear, 4 mm. long, in fruit 4-8 mm. long; corolla light yellow, unspotted; nutlets only faintly rugose, but rather strongly tubercled. Waste places and among bushes: Wash.—Ida.—B.C. My-Je.

3. *A. idahoensis* M. E. Jones. Stem about 6 dm. high, sparsely setose-hispid; basal leaves oblanceolate, very hispid; stem-leaves ovate-oblong, 3-5 cm. long; inflorescence broad and short; bracts leafy, 12-15 mm. long; nutlets obliquely ovoid, 3 mm. long, sharply tubercled, distinctly keeled on the back. Dry ground: Ida.—Mont. *Son.*

4. *A. hispidissima* Suksd. Stem very densely hispid, especially below, 3-7 dm. high; basal leaves oblanceolate, 5-8 cm. long, densely hispid; stem-leaves linear-lanceolate; sepals linear-subulate, densely hispid; corolla 8 mm. long, with orange spots in the throat. Dry and waste places: Ore.—Ida.—Utah. *Son.*—Submont. My-Je.

5. *A. Menziesii* (Lehm.) Nels. & Macbr. Stem hispid, 4-7 dm. high; basal leaves oblanceolate; stem-leaves broadly lanceolate, hispid; calyx-lobes linear; corolla light yellow, spotless, 8 mm. long; nutlets not at all rugose, densely covered with small tubercles not arranged in rows. *A. intermedia* A. Gray, in part. Hills: Ida.—B.C. *Son.* My-Jl.

6. *A. rugosa* Rydb. Stem 3-5 dm. high, densely hispid; basal leaves linear-oblanceolate, 5-8 cm. long, hispid; stem-leaves narrowly lanceolate; racemes

elongate, not leafy-bracted; sepals linear-lanceolate; corolla about 8 mm. long. *A. parviflora* Macbr., in part, not Bernh., nor Heller. Dry places: Ida.—Wash.—Nev. Son. Ap—My.

7. *A. tessellata* A. Gray. Stem branched, 3–8 dm. high, sparingly hispid; basal leaves oblanceolate, 8–15 cm. long, strongly but rather sparingly hirsute; stem-leaves lanceolate, often somewhat clasping; calyx-lobes broadly lanceolate, 5–6 mm. long, in fruit often 1 cm. long; corolla orange, about 1 cm. long. Dry and waste places: Wash.—Ida.—Utah—Calif. Son.—Submont. My—Jl.

14. *MERTENSIA* Roth. LUNGWORT, BLUEBELLS, LANGUID LADY.

Perennial caulescent herbs. Leaves alternate, entire. Flowers perfect, regular, in racemes or panicles. Calyx deeply 5-cleft, persistent, essentially unchanged in age. Corolla tubular-funnelform or trumpet-shaped, blue or purple, rarely white; throat rarely appendaged; lobes 5, imbricate. Stamens included or barely exserted; filaments often flattened. Nutlets obliquely attached by a small scar near the base to the convex receptacle, wrinkled at maturity. Style filiform; stigma entire.

Filaments equalling or exceeding, and usually broader than the anthers.

Calyx-lobes longer than the short tube, rarely slightly shorter

Calyx-lobes linear or oblong, obtuse.

Stem 3–10 dm. high

Stem 2–3 dm. high

Calyx-lobes triangular-lanceolate to linear-lanceolate, acute

Tube of the corolla at least twice as long as the throat and limb

Tube of the corolla only slightly if at all longer than the throat and limb.

Plant tall, usually more than 4 dm. high; leaves distinctly veined, in most feather-veined, but in a few triple-veined with anastomosing veins

Stem, calyx-tube and lower surface of the leaves long-hairy.

Stem glabrous; calyx strigose or merely ciliate on the margins

Plant low, usually less than 4 dm. high, leaves with a strong midrib, without distinct lateral veins (except sometimes the basal leaves, which then however are thick and firm)

Calyx-lobes rounded-ovate, much shorter than the ample, campanulate tube

Anthers subsessile or on very short narrow filaments inserted in the tube or the throat of the corolla, low plants, 1–3 dm. high, of the habit of the LANCEOLATAE group.

I CILIATAE.

Lower surface of the leaves decidedly pubescent

Lower surface of the leaves glabrous, except the ciliate margins.

Calyx-lobes oblong, 1.5–2 mm. long

Stem-leaves, at least the upper ones, narrowly lanceolate; plant very pale, pedicels usually strigillose

Stem-leaves all ovate or broadly lanceolate, pedicels usually pustulate-muricate

Calyx-lobes linear, 3 mm. long, ciliate.

II LONGIFLORAE

Plant with a tuberous-thickened root and mostly a single stem.

Leaves densely pubescent on both sides.

Leaves glabrous at least beneath.

Calyx-lobes linear-lanceolate, long-ciliate; pedicels strigose; leaves linear-oblong to oblong-lanceolate.

Calyx-lobes short-ciliate, pedicels glabrous or muriculate, leaves broader

Corolla-tube twice as long as the limb and throat, leaves setulose-scarious above

Corolla-tube almost three times as long as the limb and throat, leaves merely papillose above

Plant not tuberous-rooted, more or less caespitose.

Floral leaves oblong.

Floral leaves ovate

Pedicels scarious-muricate; corolla-tube about three times as long as the limb and throat.

Pedicels glabrous or minutely pustulate, corolla-tube about twice as long as the limb and throat

III. PANICULATAE.

Corolla about 1.5 cm. long, stem densely pubescent.

Corolla about 1 cm. long, stem sparingly pubescent.

Calyx-lobes lance-linear to lanceolate, acuminate

Calyx-lobes oblong-lanceolate, acutish

I CILIATAE

VIII INCONGRUENTES

II LONGIFLORAE

IV MEMBRANACEAE

V LANCEOLATAE.

VI BRACHYLOBAE.

VII ALPINA.

1. *M. subpubescens*.

2. *M. pallida*.

3. *M. ciliata*

4. *M. platensis*.

5. *M. eplicata*.

6. *M. oblongifolia*

7. *M. longiflora*

8. *M. pulchella*.

9. *M. nutans*.

10. *M. tubiflora*.

11. *M. fohosa*.

12. *M. ptiosa*.

13. *M. paniculata*

14. *M. toyabensis*

IV. MEMBRANACEAE.

- Pedicels hairy.
 Corolla 1 cm. or less long.
 Fruiting pedicels strongly reflexed 15. *M. refracta*.
 Fruiting pedicels ascending or nodding
 Corolla-tube over 4 mm. wide; calyx bristly-ciliate. 16. *M. cynoglossoides*.
 Corolla-tube 2-3 mm. wide
 Calyx strigose; stem-leaves ovate. 17. *M. membranacea*.
 Calyx only ciliate on the margins; leaves oblong-lanceolate or only the uppermost ovate.
 Hairs of the pedicels not with pustulate bases.
 Plant stout; pedicels bristly-hispid with spreading hairs.
 Plant slender, pedicels strigose. 18. *M. muriculata*.
 Hairs of the pedicels very short, and with pustulate bases. 32. *M. viridis*.
 35. *M. coronata*.
 19. *M. pratensis*.
 Corolla about 1.5 cm. long
 Pedicels muricate-scarious or smooth.
 Calyx-lobes not longer than the fruit, leaves broadly ovate. 20. *M. brachycalyx*.
 Calyx much exceeding the fruit; leaves oblong or lanceolate, or ovate in no 23
 Calyx-lobes shorter than the calyx-tube, bristly ciliate. 21. *M. arizonica*.
 Calyx-lobes longer than the calyx-tube
 Corolla about 15 mm. long; pedicels smooth or sparingly callous-pustulate.
 Corolla-tube not shorter than the limb and throat.
 Upper leaves at least three times as long as wide 22. *M. intermedia*.
 Upper leaves not more than twice as long as wide. 23. *M. praecox*.
 Corolla-tube shorter than the limb and throat. 24. *M. Leonardii*.
 Corolla 10 mm. long, pedicels with small hispidulous hairs with pustulate bases. 35. *M. coronata*.

V. LANCEOLATAE.

- Pedicels decidedly strigose or hirsute.
 Stem from a fusiform root, leaves glabrous beneath. 25. *M. fusiformis*.
 Stem from a more or less woody caudex or rootstock.
 Leaves pubescent on both sides, calyx usually densely pubescent all over.
 Leaves linear or only the uppermost lanceolate 26. *M. lateriflora*.
 Blades of the lower leaves ovate or spatulate
 Plant more or less grayish and densely strigose throughout.
 27. *M. Bakeri*.
 Plant green
 Pubescence short, on the stem sparse.
 Calyx conspicuously pubescent 28. *M. nitidis*.
 Calyx glabrous except the ciliate margins. 29. *M. media*.
 Pubescence longer and loose.
 Calyx less than half as long as the corolla-tube.
 30. *M. myosotifolia*.
 Calyx fully half as long as the corolla-tube 31. *M. amoena*.
 Leaves glabrous beneath; calyx usually glabrous, except the ciliate margins and sometimes the midrib.
 Calyx-lobes ovate-lanceolate, inflorescence open. 32. *M. viridis*.
 Calyx-lobes narrowly lanceolate; inflorescence dense
 Leaves narrowly linear. 33. *M. lineariloba*.
 Leaves oblong-lanceolate to ovate
 Stem-leaves ovate to lance-ovate, finely strigose above, corolla-limb and throat decidedly shorter than the tube. 34. *M. ovata*.
 Stem-leaves oblong-lanceolate, corolla-limb and throat nearly equalling the tube
 Leaf-blades scabrous-hispidulous or merely pustulate above; stem 2-4 dm. high 35. *M. coronata*.
 Leaf-blades hispidulous-strigose above; stem rarely more than 2 dm. high 36. *M. Parryi*.
 Pedicels and calyx glabrous, except the ciliate lobes of the latter.
 Calyx-lobes ovate-lanceolate; upper stem-leaves ovate 37. *M. Drummondii*.
 Calyx-lobes narrowly lanceolate, stem-leaves linear or oblong.
 Upper surface of the leaves short-pubescent. 38. *M. linearis*.
 Upper surface of the leaves not hairy. 39. *M. lanceolata*.

VI. BRACHYLOBAE.

- Calyx-lobes ciliate on the margins. 40. *M. brachyloba*.
 Calyx-lobes not ciliate on the margins. 41. *M. campanulata*.

VII. ALPINAE.

- Calyx ciliate on the margins; inflorescence narrow.
 Leaves short-strigose above, glabrous beneath.
 Corolla 7-9 mm. long, plant depressed, decumbent or ascending, 1-2 dm. high.
 Calyx-lobes obtuse. 42. *M. alpina*.
 Calyx-lobes acute 43. *M. Tweedyi*.
 Corolla more than 10 mm. long, stem about 3 dm. high. 44. *M. perpleza*.
 Leaves merely pustulate-punctate above 45. *M. humilis*.

above, more hirsute beneath; corolla 10–12 mm. long; nutlets 3 mm. long. Hills, mountain sides, cañons: Wyo.—N.M.—Ariz.—Utah; Mex. *Submont.*—*Mont.* My-Jl.

6. ***L. Gmelini*** (Michx.) Hitchc. Stem hispid, 3–6 dm. high; leaves lanceolate, or oblong, hispid, 4–8 cm. long; corolla 15–20 mm. long; limb 15–20 mm. wide; nutlets 4 mm. long. *L. hirtum* Lehm. Sandy places, dry plains, and open woods: N.Y.—Fla.—N.M.—*Mont.* *Plain*—*Submont.* Ap-Jl.

7. ***L. canescens*** (Michx.) Lehm. Stem 2–4 dm. high, hirsute or pilose; leaves oblong to linear, 1–4 cm. long, canescent-strigose; corolla 10–12 mm. long; limb about 1 cm. wide; nutlets 3 mm. long. Plains and prairies: Ont.—Ala.—Tex.—Colo.—Sask. *Plain.* Ap-Jl.

8. ***L. asperum*** A. Nels. Stems 1.5–3 dm. high, hirsute, with white divaricate hairs; leaves oblong to linear, 2–4 cm. long, rough-hirsute; corolla 2–3 cm. long; limb 1–1.5 cm. broad; lobes crenulate-erose. *L. ciliolatum* Greene. Sandstone slopes: Wyo. *Submont.* Je.

9. ***L. linearifolium*** Goldie. Stems strict, 1–5 dm. high, canescent-strigose; leaves all linear, 1–5 cm. long, strigose; corolla of the earlier flowers 2.5–3 cm. long; limb 10–18 mm. wide, erose-fimbriate; cleistogamous flowers 1 cm. long or less; nutlets more or less pitted. *L. angustifolium* Michx. Dry soil: Man—Ill.—Tex.—Ariz.—B.C. *Plain*—*Submont.* Ap-Jl.

10. ***L. oblongum*** Greene. Stems numerous, 1–2 dm. high, strigose; leaves short, 2–3 cm. long, strigose; corolla of the early flowers about 3 cm. long; limb about 1 cm. wide; nutlets pitted along the margins. Dry plains: N.M.—Wyo. *Son.*—*Plain.* Ap-Je.

11. ***L. mandanese*** Spreng. Stems many, 1–2 dm. high; leaves linear, 3–4 cm. long, mostly strigose; corolla of the early flowers 1.5–2 cm. long; nutlets sparingly pitted. Dry plains: N.D.—Tex.—Ariz.—Alta. *Plain*—*Submont.* Ap-Je.

12. ***L. breviflorum*** Engelm. & Gray. Stems several, erect, 2–4 dm. high, finely strigose; leaves narrowly linear, 3–5 cm. long, ascending; corollas of the early flowers 1 cm. long or less, deep yellow; nutlets scarcely pitted except near the margins. *L. albicans* Greene. Dry plains: Ark.—Tex.—N.M.—Colo. *Son.* My-Je.

17. **ONOSMÓDIUM** Michx. FALSE GROMWELL.

Coarse perennial caulescent herbs. Leaves alternate, entire, usually broad, strongly nerved, pubescent. Flowers perfect, regular, in terminal scorpioid racemes or spikes. Calyx persistent, with 5 narrow lobes. Corolla tubular, yellow, white, or greenish; tube elongate; throat without appendages; lobes erect. Stamens included; anthers often sessile. Nutlets white, shiny, smooth or sparingly pitted, attached by their very base to the flat receptacle, often only one or two maturing.

1. ***O. occidentale*** Mackenzie. Stem 3–6 dm. (rarely 6–12 dm.) high, branched above, white-hispid; leaves about 5 cm. long, prominently 5–7-ribbed, coarsely hirsute-strigose; corolla 12–20 mm. long, canescent, its lobes broadly triangular, acute, 3–4 mm. long; nutlets 3.5–4 mm. long, ovoid, not constricted at the base, dull, little if at all pitted. Plains and prairies: Man.—Ill.—Mo.—Tex.—N.M.—Utah—Alta. *Plain*—*Submont.*

18. **ANCHUSA** L. ALKANET.

Annual or perennial herbs, with hispid or villous foliage. Flowers bracteate, in scorpioid cymes. Calyx 5-cleft. Corolla blue or purple; tube straight; throat closed by fornicies or hairs. Nutlets rugose or granulate, inserted by a broad concave base on the flat receptacle.

1. ***A. officinalis*** L. Perennial, with a taproot; stem hispid, 3–8 dm. high; basal leaves oblanceolate, 1–2 dm. long, very hispid; stem-leaves lanceolate; corolla dark blue, fully 1 cm. long. Waste places and roadsides: N.Y.—Utah; sparingly introduced from Eu. *Plain*—*Submont.* Jl-S.

19. **SYMPHYTUM** (Tourn.) L. COMFREY.

Large hairy perennials. Leaves alternate, entire, or the uppermost opposite; the lower long-petioled. Flowers in terminal scorpioid racemes. Calyx deeply 5-cleft. Corolla blue, purple, or yellow, campanulate, with short lobes; fornicies in the throat lanceolate or linear, papillose-margined. Nutlets obliquely ovoid; scar large, concave, bordered by a prominent denticulate ring-margin.

1. **S. officinale** L. Stem 6–10 dm. high; leaves lanceolate to ovate, the lower petioled, the upper decurrent on the stem; calyx-lobes lance-linear; corolla purplish or yellowish, 1–2 cm. long. Waste places: Newf.—Md.—Mont.; adv. or escaped from cultivation; native of Eu. Je—Au

FAMILY 114. **VERBENACEAE**. Vervain Family.

Annual or perennial herbs, or in warmer climates sometimes shrubs or trees. Leaves usually alternate, rarely opposite or whorled, usually simple. Flowers perfect, more or less irregular, zygomorphic, in ours spicate. Calyx of 4 or 5, more or less united sepals, usually bracteolate. Corolla of 4 or 5, partially united petals, usually 2-lipped. Stamens 2, or 4, and then didynamous; filaments more or less adnate to the corolla; anthers erect or incumbent. Gynoecium of 2 or 4 carpels; styles united; stigma entire or 2- or 4-lobed; ovules 1 or 2 in each cavity, anatropous. Fruit separating into 2 or 4 nutlets, or drupes, or berry-like. Seeds commonly solitary in each cavity; endosperm scant or wanting; embryo straight.

Corolla-limb 5-lobed; nutlets 4, flowers in terminal spikes
Corolla 4-lobed, nutlets 2, flowers in short dense axillary spikes.

1. VERBENA.
2. PHYLA.

1. **VERBENA** (Tourn.) L. Vervain, Verbena.

Annual or perennial herbs. Leaves opposite, entire, toothed, or dissected. Flowers in terminal spikes. Calyx-tube funnelform. Corolla more or less bilabiate; tube narrow, straight or curved. Limb 5-lobed. Stamens 4, didynamous, rarely only 2; connective of the anthers often bearing a gland. Ovary 4-celled; stigma 2-lobed, only one lobe stigmatose; ovules solitary in each cell. Fruit of 4 nutlets, enclosed in the calyx.

Anthers not appendaged, flowers in elongate spikes, less than 8 mm. long.

Leaves not pinnatifid, sometimes merely lobed at the base in the first species; plant tall, erect, strict

Bracts shorter than the calyx, or barely equalling it

Spike peduncled, corolla-limb 3–6 mm. broad, pubescence sparse, coarse.

1. *V. hastata*.

Spike sessile, corolla-limb 8–9 mm. broad; pubescence dense, soft.

2. *V. stricta*.

Bracts one-third longer than the calyx; pubescence dense, soft.

3. *V. MacDougalii*.

Leaves more or less pinnatifid, at least incised, bracts much longer than the calyx.

Spike dense; nutlets muriculate on the commissural faces.

4. *V. bracteosa*.

Spike lax, nutlets nearly smooth on the commissural faces.

5. *V. remota*.

Anthers of the longer stamens appendaged by a gland on the connective; corolla 8 mm. long or more

Calyx-lobes subulate or lance-subulate

Leaves twice 3-parted into linear-oblong or lanceolate divisions.

6. *V. ciliata*.

Leaves once 3-parted, with toothed or slightly lobed divisions.

7. *V. Gooddingii*.

Calyx-lobes setaceous

Bracts narrowly lanceolate, shorter than the calyx; leaf-segments oblanceolate

8. *V. ambrosiifolia*.

Bracts setaceous, longer than the calyx, leaf-segments linear.

9. *V. biptinnatifida*.

1. **V. hastata** L. Perennial; stem 4–15 dm. high, hispidulous, branched above, 4-angled; leaf-blades scabrous-hispidulous, lanceolate or ovate-lanceolate, 4–12 cm. long, sharply and doubly serrate, often hastate at the base; spikes erect, narrow, 5–15 cm. long; calyx 2.5 mm. long, pubescent; corolla purplish

blue; nutlets smooth. River valleys, thickets and waste places: N.S.—Fla.—N.M.—Calif.—B.C. *Plain—Submont.* My—Au.

V. hastata × **stricta**. In habit resembling *V. hastata*, but the leaves more velvety-reticulate and softer pubescent and the corolla larger. Mo.—Colo.

2. V. stricta Vent. Perennial; stem stout, 3–12 dm. high, simple or branched above, densely pilose, almost velutinous, terete or nearly so; leaf-blades oblong, oval, 3–10 cm. long, doubly serrate or incised, rugose, nearly sessile, densely soft-pubescent; spike stout, strict; calyx hirsute, 5 mm. long; corolla dark blue; nutlets strongly reticulate. Dry soils, pastures, and river valleys: Minn.—Ky.—Tex.—N.M.—Wash.; introduced eastward to Conn. Je—Au.

3. V. MacDougalii Heller. Perennial; stem stout, simple, obtusely 4-angled, 3–7 dm. high, densely pilose; leaf-blades oblong-lanceolate, densely soft-pubescent, short-petioled, thick, rugose and reticulate beneath, incised-serrate, 7–9 cm. long; spikes often solitary or few, stout, dense; corolla blue; limb 4 mm. broad; nutlets striate, with a few cross-reticulations above. River valleys: N.M.—Colo.—Ariz. *Plain—Submont.* Jl—Au.

4. V. bracteosa Michx. Annual or perennial; stem branched at the base, prostrate or procumbent, 1–5 dm. long, diffusely branched, angled, more or less hirsute; leaf-blades spatulate in outline, pinnately lobed and incised or doubly-toothed, 1–6 cm. long, prominently veined beneath, hirsute; bracts lanceolate or linear-lanceolate; calyx bristly, 3 mm. long; corolla purple or bluish; limb 2 mm. broad; nutlets strongly reticulate on the back. *V. rudis* Greene. Waste places, prairies and plains: Man.—Ill.—Fla.—Tex.—Calif.—B.C. *Plain—Submont.*

V. bracteosa × **hastata**. Resembling most *V. bracteosa* in habit, but stouter, more erect, with broad, lacinate rather than dissected leaves and shorter bracts. Neb.—Colo.

V. bracteosa × **stricta**. Resembling *V. bracteosa* in habit, but stouter, with broad, lacinate, strongly reticulate leaves and larger flowers. Mo.—Kans.—Neb.

5. V. remota Benth. Annual or perennial; stem mostly erect, sparingly branched, 2–4 dm. high, round-angled, hirsute; leaf-blades obovate in outline, mostly bipinnatifid, with lanceolate divisions, 2–8 cm. long, hirsute; bracts linear or linear-subulate; calyx 2–2.5 mm. long, hirsute; teeth subulate, short; corolla lilac, 4–5 mm. long; nutlets reticulate on the back. Plains and waste places: Utah—c Mex. Son. Ap—N.

6. V. ciliata Benth. Perennial; stem branched at the base, 0.5–2 dm. high, decumbent, hirsute, leafy; leaf-blades 2–4 cm. long, obovate in outline; calyx becoming 7–8 mm. long; corolla 1–1.5 cm. long; limb 7–8 mm. wide; nutlets strongly wrinkled. Dry plains and hills: Tex.—Colo.—Ariz.; Mex. Son.—*Submont.* Ap—Au.

7. V. Gooddingii Briq. Perennial; stem 2–5 dm. high, robust, hirsute, branched; leaves spatulate or obovate in outline, densely hirsute; spikes very short; bracts lanceolate, acuminate, shorter than the calyx, corolla 12–15 mm. long; limb 8 mm. broad. Sandy bottom lands: Nev.—s Utah—Ariz. Son. Mr—My.

8. V. ambrosifolia Rydb. Perennial; stem branched and decumbent at the base, sparingly hirsute, 2–4 dm. long; leaf-blades obovate in outline, bipinnatifid or biternately divided, with oblanceolate divisions, sparingly hirsute; calyx becoming 8–9 mm. long; corolla-limb 6–8 mm. wide; nutlets coarsely wrinkled all over the back. Plains and stony soil: S.D.—Tex.—Ariz. Son—*Plain—Submont.* Je—Au.

9. V. bipinnatifida Nutt. Perennial; stems often branched at the base, 1–4 dm. high, decumbent at the base; leaf-blades 2–5 cm. long, bipinnatifid; segments linear; calyx becoming 9–10 mm. long; corolla-limb 7–9 mm. wide; nutlets 3 mm. long, prominently wrinkled above. Plains and dry ground: S.D.—La.—Tex. Son.—*Plain.* My—Jl.

2. PHŶLA Lour.

Perennial, caulescent, prostrate or creeping herbs. Leaves opposite, petioled, toothed or lobed. Flowers perfect, in dense, sometimes head-like, peduncled axillary spikes, conspicuously bracted. Calyx-tube flattened and 2-

keeled. Corolla 2-lipped; tube curved; limb 4-lobed, oblique. Stamens 4, didymous; connective of the anthers not appendaged. Ovary 2-celled; stigma oblique; ovules solitary in each cell. Fruit tardily separating into two nutlets. [*Lippia* in part.]

Leaves from linear-ob lanceolate to cuneate, 2-8-toothed above; peduncles slightly if any exceeding the leaves.

Leaves lanceolate, oblong, or oval, sharply serrate; peduncles much exceeding the leaves.

1. *P. cuneifolia*.

2. *P. lanceolata*.

1. ***P. cuneifolia*** (Torr.) Greene. Stems branched at the base, procumbent or creeping, 2-10 dm. long; leaves opposite and more or less fascicled in the axils; blades 1-3 cm. long; midvein prominent, the lateral ones obsolete; corolla purplish or whitish, 4 mm. long. *Lippia cuneifolia* (Torr.) Steud. Plains and prairies: S.D.—Tex.—Ariz.—Wyo. Plain—Submont. Je—Au.

2. ***P. lanceolata*** (Michx.) Greene. Stem branched from the base, procumbent, 1-4 dm. long; leaves opposite, rarely fasciculate; blades elliptic-lanceolate, 1.5-5 cm. long, acute, with about 4 pairs of lateral veins; corolla pale blue, 2-2.5 mm. long. Valleys: Ont.—Fla.—Tex.—Neb. Plain—Son. Je—O.

FAMILY 115. LAMIACEAE. MINT FAMILY.

Aromatic herbs or shrubs, with 4-angled stems. Leaves opposite or whorled, simple, usually toothed or lobed, glandular-punctate. Flowers perfect, irregular, zygomorphic, or nearly regular, pseudo-vericillate, *i. e.*, in congested axillary reduced cymes. Calyx of 5 united sepals, sometimes regular, sometimes irregular, and then usually 2-lipped. Corolla bilabiate, or nearly regular. Stamens 4, didynamous, or one of the pairs abortive; anthers 2-celled. Gynoecium of united carpels; ovary 4-lobed and 4-celled; styles united, arising between the lobes; stigma terminal; ovules solitary in each cell. Fruit of 4 nutlets, included in the persistent calyx. Endosperm fleshy or wanting.

Ovary of 4 united nutlets, style not basal; nutlets laterally attached

Corolla strongly bilateral, the upper lip very small, the lower large

Flowers in small congested cymes, axillary to small bracts, and forming a raceme-like panicle, calyx-lobes shorter than the tube; leaves toothed.

1. TEUCRIUM.

Flowers solitary in the axils of bracts similar to the leaves, calyx-lobes longer than the tube, leaves lacinate.

2. MELOSOMON

Corolla almost regularly 5-lobed, but lobes declined; stamens long-exserted and coiled

3. TRICHOSTEMA

Ovary of 4 distinct or nearly distinct nutlets; styles basal; nutlets basally attached

Corolla bilabiate

Calyx 2-lipped, both lips entire, stamens 4

Calyx not inflated, the upper lip with a crest on the upper side

4. SCUTELLARIA.

Calyx inflated, without a crest

5. SALAZARIA

Calyx either 2-lipped and at least one of the lips toothed, or regularly 4-5-toothed.

6. MARRUBIUM.

Stamens included in the corolla-tube

Stamens exserted from the tube

Upper lip of the corolla concave.

Anther-bearing stamens 4.

Upper stamens longer than the lower.

Calyx 5-toothed.

Anther-sacs parallel or nearly so; stamens divergent

7. AGASTACHE.

Anther-sacs divaricate; anther approximate in pairs.

Flowers in terminal spikes, floral leaves reduced; plant erect

8. NEPETA

Flowers in axillary verticils; floral leaves like the rest; plant spreading.

9. GLECOMA.

Calyx distinctly 2-lipped.

10. MOLDAVICA.

Upper stamens shorter than the lower.

Calyx distinctly 2-lipped, closed in fruit

11. PRUNELLA

Calyx 5-toothed, not 2-lipped, open in fruit

Calyx membranous, inflated in fruit, faintly nerved.

12. DRACOCEPHALUM.

Calyx not membranous, not inflated in fruit, strongly 5-10-nerved.

Bracts thin and pale, oval to orbicular; leaves usually entire.

Leaves tomentulose, especially beneath

Leaves sparingly and minutely puberulent or glabrous.

Calyces and bracts 8-12 mm. long.

Stem stout, leaves subsessile, ovate.

Stems slender; leaves distinctly petioled, oblong.

Calyces and bracts about 6 mm. long

Bracts thick, resembling the leaves, lanceolate or ovate-lanceolate, obtuse; leaves usually dentate.

1. *M. odoratissima*.

2. *M. sessilifolia*.

3. *M. oblongifolia*.

4. *M. parvifolia*.

5. *M. dentata*.

1. *M. odoratissima* (Benth.) Greene. Stems decumbent at the base, more or less grayish pilose, with short hairs; leaves oblong or lance-oblong, subsessile or the lower short-petioled, 2-3 cm. long; bracts oval, densely pilose and ciliate on the margins, 8-10 mm. long; calyx-lobes narrowly lanceolate, strongly ciliate; corolla about 12 mm. long. *Monardella odoratissima* Benth. Mountains: Ore.—Wash.—Ida. *Submont.* Jl—Au.

2. *M. sessilifolia* Rydb. Stems stout, about 3 dm. high, finely puberulent; leaves entire, obtuse, rather pale; bracts oval, 10-12 mm. long, puberulent on the back, ciliate on the margins; calyx-lobes lanceolate, about 1 mm. long; corolla 12-13 mm. long, pubescent. Dry hills: s Utah. *Son.*

3. *M. oblongifolia* Rydb. Stems 1-3 dm. high; leaf-blades oblong, 1-3 cm. long, entire, obtuse; bracts pale or tinged with rose, finely puberulent, ciliate on the margins, oval; calyx-teeth lanceolate, and strongly ciliate; corolla white to rose-colored, 12-14 mm. long, puberulent. *M. purpurea* A. Nels., in part. Dry mountain sides: Utah—Nev.—Ida. *Submont.*—*Mont.* Jl—Au.

4. *M. parvifolia* (Greene) Rydb. Stems many, decumbent at the base, puberulent; leaf-blades ovate-lanceolate or oblong-lanceolate, obtuse, entire, 1-1.5 cm. long; bracts slightly rose-tinged, puberulent, ciliate-margined; calyx-lobes lanceolate, not conspicuously ciliate; corolla lilac-purple, scarcely 1 cm. long. *Monardella parvifolia* Greene. Cañons: Colo. *Submont.* Jl—Au.

5. *M. dentata* Rydb. Stems slender, light brown, about 3 dm. high; leaves short-petioled; blades ovate, 1.5-2 cm. long, serrate-dentate, finely pubescent and strongly punctate, obtuse, strongly veined beneath; calyx about 8 mm. long, grayish pubescent; lobes lanceolate; corolla about 12 mm. long. Mountains: Colo. *Submont.*

25. MICROMERIA Benth. TEA-VINE, YERBA BUENA.

Perennial herbs or somewhat shrubby plants, often with creeping stems. Leaves opposite, entire or sparingly toothed, petioled. Flowers perfect, either solitary or in small clusters in the axils. Calyx nearly tubular, 13-ribbed, slightly 2-lipped, but the 5 teeth nearly equal. Corolla small, 2-lipped; upper lip erect, usually very small; lower lip 3-lobed, with the middle lobe often notched. Stamens 4, anther-bearing; anthers 2-celled, with divergent sacs. Nutlets smooth.

1. *M. Chamissonis* (Benth.) Greene. Stem decumbent, trailing or creeping, 2-5 dm. long, finely puberulent; leaf-blades broadly ovate or rounded, crenate or entire, 1-3 cm. long, slightly puberulent or glabrate; calyx naked in the throat, 4 mm. long; corolla about 1 cm. long. *M. Douglasii* Benth. Woods: B.C.—Ida.—Calif. *Submont.* My—Au.

24. LYCOPUS (Tourn.) L. WATER HOREHOUND, BUGLE WEED.

Perennial caulescent herbs, mostly odorless, often stoloniferous. Leaves opposite, entire, toothed, or pinnatifid. Flowers perfect, in remote axillary verticils. Calyx regular or nearly so, 4- or 5-toothed. Corolla funnelform or campanulate; lobes 4, nearly equal, or one of them broader. Anther-bearing stamens 2, with or without 2 additional rudimentary filaments. Anther-sacs 2, parallel. Nutlets 3-angled, truncate, smooth.

Calyx-teeth ovate, obtusish, shorter than the nutlets.

Calyx-teeth lanceolate or subulate, acute or acuminate, longer than the nutlets.

Stem and lower surface of the leaves densely and finely pubescent, the former often velvety.

1. *L. communis*.

2. *L. velutinus*.

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- Anther-bearing stamens 2; calyx of 5 almost distinct sepals; sterile filaments short or wanting. 14. GRATTOLA.
 Upper lip or lobes internal in the bud.
 Stamens 2.
 Corolla almost regularly 4-lobed.
 Corolla rotate, leaves opposite or verticillate. 15. VERONICA.
 Corolla campanulate or short-tubular; leaves alternate, mostly basal. 16. SYNTHYRIS.
 Corolla none, or 2-lipped, cleft to near the base; upper lip entire, the lower irregularly cleft or toothed, basal leaves ample, stem-leaves bract-like, reduced and alternate. 17. BESSEYA.
 Stamens 4.
 Corolla slightly 2-lipped, stamens not ascending under the upper lip. 18. AGALINIS.
 Corolla distinctly 2-lipped, stamens ascending under the upper lip.
 Anther-sacs dissimilar, the inner one pendulous by its apex; leaves mostly alternate.
 Calyx gamosepalous.
 Calyx deeply cleft in front and behind, less deeply so on the sides; upper lip of the corolla much longer than the 3-lobed lower one. 19. CASTILLEJA.
 Calyx almost equally 4-cleft, upper lip of the corolla slightly if at all longer than the 1-3-saccate lower one, which is minutely or obsoletely toothed.
 Lip 1-saccate. 20. ORTHOCARPUS.
 Lip 3-saccate. 21. TRIPHYSARIA.
 Calyx 2-phyllous, 1 c, cleft to the base on the sides or, by the absence of the lower leaf, 1-phyllous. 22. ADENOSTEGIA.
 Anther-sacs alike, parallel, leaves mostly opposite.
 Margins of the 2-lobed upper lip of the corolla recurved; calyx 4-cleft. 23. EUPHRASIA.
 Margins of the upper lip of the corolla not recurved.
 Ovules several or numerous; capsule several or many-seeded.
 Calyx split below, or below and above, not inflated; capsule ovoid or oblong, oblique.
 Galea prolonged into a filiform recurved beak, throat with a tooth on each side. 24. ELEPHANTELLA.
 Galea if prolonged into a beak, the latter not filiform, straight or incurved; throat without teeth.
 25. PEDICULARIS.
 Calyx 4-toothed, inflated and veiny in fruit.
 26. RHINANTHUS.
 Ovules 2 in each cell, fruit 1-4-seeded. 27. MELAMPYRUM.

1. VERBÁSCUM (Tourn.) L. MULLEN.

Annual, biennial, or rarely perennial, caulescent herbs, more or less glandular or densely pubescent with branched hairs. Leaves alternate, entire, toothed, or pinnatifid, sometimes decurrent. Flowers perfect, in terminal spikes, racemes, or panicles. Sepals 5, partly united. Corolla rotate, 5-lobed, slightly irregular, the upper lobe exterior in the bud. Stamens 5, all fertile, exserted, the upper 3, or all of the filaments pubescent. Ovary 2-celled; styles dilated or flattened at the apex. Capsule oblong to subglobose, 2-valved, septicidal. Seeds rugose, wingless.

- Plant densely woolly; flowers in a dense spike. 1. *V. Thapsus*.
 Plant glabrous or glandular; flowers racemose.
 Pedicels longer than the fruit, plant glabrous or sparingly glandular. 2. *V. Blattaria*.
 Pedicels shorter than the fruit, plant densely glandular. 3. *V. virgatum*.

1. *V. Thapsus* L. Biennial; stem stout, 3-20 dm. high, woolly with densely matted branched hairs, winged; lower leaves spatulate or elliptic, 1-4 cm. long; upper stem-leaves oblanceolate, densely woolly; raceme dense and spike-like, continuous, 1-10 dm. long; calyx-lobes triangular-lanceolate; corolla deep yellow, rarely white, 1-2.5 cm. wide, pubescent without. Waste places, fields, and roadsides: N.S.—Fla.—Calif.—B.C.; nat. from Eu. *Plain—Submont.* Je—Au.

2. *V. Blattaria* L. Biennial; stem rather slender, 4-12 dm. high, glabrous below, glandular above; basal leaves obovate or spatulate; stem-leaves oblong or ovate, the upper clasping, 2-12 cm. long, dentate, incised or lobed, glabrous; raceme slender, interrupted, 1-5 dm. long; calyx-lobes linear or oblong, recurved; corolla white or yellow, 3-4 cm. broad; filaments magenta. Fields and waste places: Que.—Fla.—Calif.—B.C.; nat. from Eu. *Plain—Submont.* My—S.

23. *P. Palmeri* A. Gray. Stem 6-10 dm. high, glabrous; lower leaves spatulate, petioled, the upper ovate, lanceolate, or oblong, sessile or perfoliate, sharply dentate; calyx glandular-pubescent; lobes broadly ovate, cuspidate, scarious-margined; corolla cream-colored, tinged with pink, from a narrow, short tube, strongly ventricose, about 2 cm. long; sterile stamen densely yellow-bearded. Dry regions: s Utah—Nev.—Calif. *Submont.* Je-Jl.

24. *P. grandiflorus* Nutt. Stem 6-12 dm. high, glabrous; basal leaves glaucous, glabrous, obovate, entire; upper stem-leaves broadly ovate, oval, or rounded; calyx about 5 mm. long, glabrous; lobes ovate, acute; corolla about 4 cm. long, pink, strongly ventricose, with a narrow tube; sterile stamen hooked and minutely pubescent at the apex. *P. Bradburyn* Pursh. Prairies and plains: Wis.—Mo.—Okla.—Colo.—Wyo. *Plain.* My-Jl.

25. *P. Hallii* A. Gray. Caudex caespitose; stem glabrous, 1-2 dm. high; basal leaves linear-oblanccolate, obtuse, thick, glabrous; stem-leaves narrowly linear-lanceolate or linear; inflorescence short; calyx 4 mm. long; lobes broadly obovate, abruptly acuminate, with scarious erose margins; corolla 15-20 mm. long, ventricose, without distinct tube; sterile filament short-bearded. High mountains: Colo.—Utah. *Subalp.—Alp.* Jl—Au.

26. *P. cyathophorus* Rydb. Stem very strict, 3-4 dm. high; basal leaves and lower stem-leaves spatulate, petioled, 3-6 cm. long, the others ovate or orbicular, often abruptly acuminate or mucronate; calyx 6-8 mm. long; lobes lanceolate, scarious-margined and more or less erose-dentate; corolla pink-purple, 12-15 mm. long, little oblique and scarcely ventricose; sterile stamen with a yellow beard. Mountains: n Colo.—s Wyo. *Submont.—Mont.* Jl.

27. *P. pachyphyllus* A. Gray. Stem 3-6 dm. high, stout, glabrous and glaucous; basal leaves petioled, 6-10 cm. long, glabrous and glaucous; blades thick, oval, rounded at the apex; lower stem-leaves oblong or elliptic, the upper ones and the bracts oval, the latter usually scarious-margined; calyx glabrous, 5 mm. long; corolla 15-20 mm. long; sterile stamen spatulate, densely bearded. *P. acuminatus major* Benth. *P. acuminatus congestus* M. E. Jones. Plains: Utah.—Ariz. *Son.* Je.

28. *P. acuminatus* Dougl. Stem glabrous and glaucous, strict, 2-4 dm. high; lower leaves oblanceolate, glabrous, glaucous, 2-6 cm. long; upper leaves and bracts broadly ovate or cordate, abruptly acuminate, strongly veined; calyx glabrous, 8-10 mm. long; corolla blue or purple, about 2 cm. long, funnelform. Plains: Wash.—Alta.—Ida.—Nev. *Son.* My-Jl.

29. *P. nitidus* Dougl. Stem 2-3 dm. high, glabrous, glaucous; lower leaves oblanceolate, 3-5 cm. long, glabrous, entire; upper leaves and bracts lanceolate or ovate, acute or abruptly acuminate; calyx glabrous, 4-6 mm. long; corolla blue, 15-18 mm. long, obliquely funnelform. Plains: Man.—S.D.—Wyo.—Wash.—Alta. *Plain.* My-Jl.

30. *P. arenicola* A. Nels. Stems 2-3 dm. high, glabrous and glaucous; lower leaves petioled, oblanceolate or spatulate, the middle ones oblong and the uppermost lanceolate; calyx glabrous, 4 mm. long; sepals lanceolate, acute, slightly scarious; corolla 12-15 mm. long; sterile stamen obliquely spatulate, bearded. Sand-dunes: Wyo. *Plain.* Je.

31. *P. secundiflorus* Benth. Stem glabrous and glaucous; basal leaves oblanceolate, 3-7 cm. long, glaucous and glabrous; stem-leaves lanceolate to ovate-lanceolate, more or less acuminate; inflorescence secund; calyx 5-6 mm. long, glabrous, often somewhat bluish; corolla about 2 cm. long, funnelform, bluish purple; sterile stamen club-shaped, curved, densely bearded. Dry plains or hills: Wyo.—N.M.—Utah. *Submont.—Mont.*

32. *P. Fendleri* A. Gray. Stem glabrous and glaucous, 1-2 dm. high; basal leaves petioled, 3-6 cm. long; blades oval or ovate; stem-leaves ovate to lanceolate; bracts small, lanceolate; calyx 4 mm. long; corolla 15-18 mm. long, almost salverform; sterile stamen club-shaped, densely yellow-bearded. Dry plains: Colo.—w Tex.—N.M.—(? Calif.). My-Jl.

33. *P. Haydenii* S. Wats. Stem 2-5 dm. high, stout, leafy, glabrous; lower leaves, especially those of the shoots, narrowly linear, the upper stem-leaves linear-lanceolate; calyx glabrous, about 8 mm. long; lobes lanceolate, acuminate; corolla blue, funnelform; sterile stamen bearded at the apex. Sand hills: Neb.—Wyo. *Plain.* Je-Jl

34. *P. caudatus* Heller. Stem glabrous, 2-4 dm. high, leafy; lower leaves 4-7 cm. long; stem-leaves lanceolate, linear-lanceolate or the upper ovate-lanceolate, acuminate; calyx about 5 mm. long; lobes lanceolate, scarious-margined, long-acuminate; corolla violet, about 2 cm. long, funnelform; sterile stamen bearded on the upper half. *P. angustifolius caudatus* Rydb. Hills: N.M.—Colo. *Submont.* My-Jc.

35. *P. angustifolius* Pursh. Stems 1-3 dm. high, glabrous; leaves linear or the upper linear-lanceolate, 5-10 cm. long, glabrous; calyx glabrous, about 5 mm. long; lobes lanceolate, acuminate, often with narrow scarious margins; corolla about 15 mm. long, blue, lilac, or white, funnelform, scarcely ventricose; sterile stamen bearded above. *P. coeruleus* Nutt. Plains: S.D.—Colo.—Mont. *Plain.* My-Jl.

36. *P. petiolatus* Brand. Stem about 1 dm. high, caespitose from a woody root, puberulent, glandular in the inflorescence; petioles 1-1.5 cm. long; leaf-blades 1-2 cm. long, cinereous-puberulent, sharply serrate, abruptly acuminate; bracts ovate, acuminate, 1-3 mm. long; calyx-lobes ovate, 6 mm. long; corolla 15 mm. long, broadly funnelform; lower lip bearded within; sterile stamen bearded. Hills: Nev.—s Utah. *Submont.*

37. *P. stenosepalus* (A. Gray) Howell. Stem 1-5 dm. high, glabrous up to the inflorescence; basal leaves petioled, 3-7 cm. long, glabrous; blades spatulate or elliptic; stem-leaves sessile, lanceolate or linear-lanceolate, acuminate; calyx glandular-hirsute, 7-10 mm. long; lobes lance-subulate, attenuate; corolla 18-20 mm. long, funnelform, slightly ventricose, dull-white, rose, or purplish; sterile stamen club-shaped, bearded above. *P. glaucus stenosepalus* A. Gray. Mountains: Wyo.—N.M.—Ariz.—Utah. *Mont*—*Subalp.*

38. *P. Erianthera* Pursh. Stem stout, 1-4 dm. high, leafy, canescent and more or less villous, especially above; basal leaves spatulate or oblanceolate, petioled, 5-10 cm. long; stem-leaves oblong or linear, entire or nearly so, grayish puberulent and sometimes villous on the veins; calyx fully 1 cm. long; lobes lance-subulate; sterile stamen with very long yellow hairs, two-thirds its length; throat long-bearded within. *P. cristatus* Nutt. Plains: N.D.—Neb.—Nev.—Wash. *Plain.* My-Jl.

39. *P. saliens* Rydb. Stems 2-3 dm. high, finely puberulent; basal leaves petioled, about 5 cm. long; blades obovate or oblanceolate, finely puberulent; stem-leaves oblanceolate to linear-lanceolate; calyx about 1 cm. long, villous-glandular; lobes linear-lanceolate, acuminate; throat and sterile stamen long-bearded. Plains: Mont. *Plain.* Je.

40. *P. Cleburnei* A. Nels. Stem low, densely puberulent, 1-2 dm. high; basal leaves entire or nearly so, petioled, ovate or elliptic, 2-4 cm. long; stem-leaves narrowly oblong; calyx minutely glandular, about 8 mm. long; lobes lanceolate; corolla-throat short-villous within; sterile stamen long-villous at the apex. *P. Jamesii* A. Nels., not Benth. *P. auricomus* A. Nels. Dry plains and hills: Wyo.—S.D.—Mont. *Plain.* My-Je.

41. *P. Moffattii* Eastw. Stems 1-3 dm. high, densely grayish puberulent; basal leaves petioled, ovate-spatulate, entire, grayish-puberulent; upper leaves lanceolate; calyx glandular-hirsute; lobes linear-oblong or linear-lanceolate; corolla purplish blue; sterile stamen moderately bearded towards the apex. *P. pseudo-humilis* M. E. Jones, not Rydb. Dry table-lands: Utah—Colo. *Submont.* My-Je.

42. *P. Jamesii* Benth. Stems 1-3 dm. high, grayish puberulent, glandular in the inflorescence; lower leaves narrowly linear-lanceolate, 3-10 cm. long; upper stem-leaves linear or linear-lanceolate; calyx glandular-villous, 8-10 mm. long; corolla glandular-villous; sterile stamen yellow-bearded at least half its length;

yellow, funnelform, 15-18 mm. long. Mountains: Ida.—(? Colo.)—Calif.—B.C. *Submont.*—*Mont.* Ap-Je.

4. **M. thermalis** A. Nels. Stem erect, 3-15 cm. high, glabrous below, puberulent above; leaf-blades nearly orbicular, obscurely dentate, 3-9 mm. long, the upper sessile, the lower short-petioled; calyx 5 mm. long, in fruit 1 cm. long; teeth broadly triangular-ovate, acute; corolla about 15 mm. long, funnelform, yellow, short-pubescent on the lower lip. Geyser formations. Yellowstone Park, Wyo. *Mont.* Au.

5. **M. Hallii** Greene. Stem angled, glabrous, 1-3 dm. high; leaves broadly ovate, sparingly dentate or entire, 1-2 cm. long, the lower petioled, glabrous; calyx 5 mm long, in fruit nearly 1 cm and subglobose-inflated, with a few spots; teeth triangular, acute, the upper tooth about twice as long as the others; corolla 5-8 mm long, light yellow. Wet places in the mountains: Colo.—(? Mont.)—(? Ida.). *Submont.* My-Jl.

6. **M. microphyllus** Benth. Stem 1-2, rarely 3 dm. high, simple, erect, glabrous; leaves nearly all petioled; blades orbicular, sinuate-dentate, at the base cordate and more coarsely toothed, 1-2 cm. broad, those of the inflorescence similar, subsessile and usually villous-puberulent; calyx 8-10 mm long; corolla yellow, about 1 cm. long; tube scarcely exerted from the calyx. Wet places. Wash.—Ore—Ida. *Submont.* Ap-Je.

7. **M. Geyeri** Torr. Perennial; stem 1-4 dm long, glabrous; leaves rounded or reniform, denticulate to entire, 8-25 mm long, all except the uppermost with margined petioles; calyx glabrous or slightly puberulent, 5-8 mm. long; upper lobe broadly ovate, twice as long as the very short rounded other lobes; corolla yellow, 8-12 mm long. *M. Jamesii* T. & G. In water: Mich.—Ill—Colo.—Wyo.—N D. *Plain*—*Submont.* Je-Au.

8. **M. Lewisii** Pursh. Stem 3-10 dm high, more or less viscid-pilose; leaves lanceolate, oblong or ovate, dentate, 4-8 cm. long, viscid-pubescent; calyx glandular-pubescent, about 2 cm. long; teeth broadly-triangular, subulate-acuminate; corolla crimson, rose-red, or paler, 3.5-5 cm. long, bearded within. Along streams: Minn—Colo.—Ariz—Calif—B C. *Plain*—*Mont.* Je-Au.

9. **P. Eastwoodiae** Rydb. Perennial, with a rootstock and stolons; stems 1-2 dm. high, viscid-villous; leaves sessile, coarsely dentate, viscid, 3-5-ribbed, 2-5 cm. long, the lower cuneate, the upper obovate or oblanceolate; stolons 1-3 cm long, rooting at the end; calyx narrowly funnelform; lobes lanceolate, subequal; corolla crimson, 3-4 cm long; anthers sparingly bearded. In crevices of overhanging cliffs: se Utah. *Son.* Au.

10. **M. moschatus** Dougl. Stem 1-4 dm, decumbent or creeping; leaf-blades petioled, ovate or oblong-ovate, villous and viscid; calyx prismatic, 7-10 mm. long; teeth broadly lanceolate, acuminate, somewhat unequal; corolla 15-20 mm. long, yellow, funnelform. MUSK FLOWER. Wet places: Ont.—Colo.—Calif.—B C. *Submont.*—*Mont.* My-Au.

11. **M. peduncularis** Dougl. Stem erect, viscid-puberulent, 1-6 dm. high; leaf-blades 0.5-2 cm. long, ovate, dentate; peduncles slender, surpassing the leaves; calyx nearly glabrous, 6 mm long; teeth short, ovate; corolla funnelform, yellow, 1.5-2 cm. long. Sandy banks: Wash.—Ida.—Ore. *Son.* My-O.

12. **M. floribundus** Dougl. Stem 1-3 dm. high, erect or diffuse, villous and viscid; leaf-blades ovate or subcordate, viscid-villous; calyx short-campanulate, 4-5 mm long; teeth triangular; corolla yellow, 6-10 mm long, tubular-funnelform. Wet places, sandy soil: Mont.—Colo.—Ariz.—Calif.—B C. *Submont.* My-Au.

13. **M. membranaceus** A. Nels. Stem weak, diffusely spreading, glabrous or slightly viscid, 2-20 cm. high; leaf-blades very thin, elliptic to ovate, entire or denticulate; calyx obscurely viscid-puberulent, 2-3 mm long; teeth triangular-lanceolate; corolla yellow, nearly tubular, 5-8 mm. long. Wet shaded places in the mountains: Wyo.—Utah. *Mont.* Jl-Au.

14. **M. breviflorus** Piper. Stem slender, erect, 4-20 cm. high, minutely puberulent; leaves short-petioled; blades lanceolate to ovate, acute, minutely

few-toothed, about 1 cm. long; calyx narrowly campanulate, 2-3 mm. long, in fruit 6-8 mm. long; teeth triangular; corolla pale yellow, tubular, 4-5 mm. long; lobes rounded. Wet places: Wash.—Ida.—Orc. *Son.*—*Submont.* My-Je.

15. *M. primuloides* Benth. Perennial by filiform stolons; stems very short, with crowded, elliptic, soft-villous or in age glabrate, dentate leaves 1-2 cm. long; peduncles 5-10 cm. long, erect; calyx 5-7 mm. long, angled, oblong-cylindric; lobes ovate, acute, 1 mm. long; corolla yellow, 15-20 mm. long, with a narrow tube. Wet soil: Calif.—Nev.—Ida.—Wash. *Submont.*—*Mont.* Je-Au.

16. *M. pilosus* Benth. Stem 1-4 dm. high, softly villous; leaves lanceolate or oblong-lanceolate, sessile, entire, villous, obscurely 3-nerved at the base; calyx-teeth ovate or oblong, the upper slightly longer; corolla bright, slightly 2-lipped, nearly 1 cm. long; capsule oblong, ovate. Gravelly soil along streams: Ida.—Ariz.—Calif.—Ore. *Son.* Jl.

17. *M. Suksdorfii* A. Gray. Stem 2-10 cm. high, branched at the base, viscid-puberulent, reddish; leaves sessile, oblong or linear, 1-2 cm. long, thick, reddish; calyx 3 mm. long, in fruit 5 mm. long; teeth short; corolla 4-6 mm. long, yellow; lobes obcordate. Wet places: Colo.—Ariz.—Calif.—B. C. *Submont.* Je-Jl.

18. *M. gratioloides* Rydb. Stem branched, more or less reddish, generally less than 1 dm. high, somewhat viscid-puberulent above; leaves oblong-lanceolate, sessile, about 1 cm. long, sinuate-dentate; calyx 7-8 mm. long, cylindraceous in fruit; lobes short, broadly ovate, acute; corolla only slightly bilabiate. Hillsides: Colo.—Ariz. *Submont.* My-Jc.

19. *M. rubellus* A. Gray. Stem viscid-puberulent, 2-10 cm. long; leaves sessile, lanceolate, 1-3 cm. long, entire or denticulate, usually reddish; calyx 4-5 mm. long, tubular; teeth rounded-ovate; corolla rose-colored or purple-tinged, 7-8 mm. long; lower lip entire. Cliffs and sand: s Utah—N M.—Calif.—Wash. *Son.* Ap-Jl.

20. *M. Breweri* (Greene) Coville. Stem 5-10 cm. high, glandular-villous; leaves linear, entire, 2-3 cm. long, sessile; calyx glandular-villous, 4 mm. long; teeth short-triangular; corolla light purple, 8-10 mm. long; lobes subequal, emarginate. Damp rocky places: Calif.—B. C. *Mont.* Je-Jl.

11. *EUNANUS* Benth.

Low annual herbs. Leaves opposite, usually dentate. Flowers perfect, on solitary peduncles in the upper axils. Calyx tubular, 5-angled and 5-toothed. Corolla more or less bilabiate, salver-shaped; lobes more or less spreading. Stamens 4, didynamous. Styles glandular above, united up to the peltate-funnelform stigma. Capsule shorter than the calyx, loculicidal, with the placentae separating in the middle and remaining attached to the valves. Seeds numerous, often muricate.

Calyx hardly at all oblique; teeth almost equal in length; stem glandular-pubescent

Calyx-lobes lanceolate-subulate, upper stem-leaves somewhat acuminate, corolla more than 2 cm. long 1 *E. Bigelovii*.

Calyx-lobes oblong-lanceolate, merely acute, leaves obtuse or acute, corolla 1.5-2 cm. long. 2 *E. Tolmiei*

Calyx decidedly oblique; upper tooth twice as long as the lower; plant glandular-puberulent. 3 *E. Parryi*

1. *E. Bigelovii* A. Gray. Stem glandular-pilose, 5-20 cm. high, branched; leaves oblong or elliptic, or the upper ovate; calyx 10-12 mm. long, glandular; corolla salverform, about 2 cm. long or more, 1-2 cm. broad, crimson, with a yellow center. Sandy and stony places: Wash.—s Calif.—s Utah. *L. Son.* My-S.

2. *E. Tolmiei* Benth. Stem 2-15 cm. high, glandular-pubescent throughout, simple or branched from the base; leaves oblong-ovate to oblanceolate, 0.5-2 cm. long, 3-nerved, entire or somewhat toothed; calyx 6-10 mm. long; corolla pale purple or rarely yellowish, often spotted, narrowly funnelform. *M. chincola* Greenm. (?) *Mimulus nanus* H. & A. *M. Tolmiei* Rydb. *E. chincola* (Greenm.) Heller. Sandy places: Mont.—Wyo.—Ore. Je-Au.

3. E. Parryi (A. Gray) Greene Stem glandular-puberulent or glabrate, 5-10 cm. high; leaves oblong or oblanceolate, 1-2 cm. long; calyx about 8 mm. long; teeth acute, the upper larger, ovate, the rest lanceolate; corolla yellow or pink, 1.5-2 cm. long, narrowly funnelform. Gravelly hills: s Utah—Ariz. *L. Son.* Ap-Je.

12. MONNIÈRA (B. Juss.) P. Br. WATER HYSSOP.

Perennial succulent herbs, with creeping or floating stems. Leaves opposite, entire or somewhat toothed, broadest above the middle, palmately veined, sessile. Flowers perfect, axillary, solitary, peduncled. Calyx subtended by 2 small bractlets; sepals nearly distinct, unequal, the uppermost the broadest. Corolla blue or white, nearly regular, 5-lobed; lobes spreading. Stamens 4, slightly didynamous, included; filaments adnate to the tube of the corolla. Capsule ovoid or oval, septicidal, the valves 2-cleft. Seeds numerous. [*Herpestes* Gaertn.]

1. M. rotundifolia Michx. Stem more or less densely pilose, creeping or floating, rooting at the nodes; leaves sessile, rounded-obovate or suborbicular, 1-2 cm. long; calyx glabrous, 4 mm. long; lobes elliptic, obtuse, the upper larger; corolla white or yellowish, 5-6 mm. long, campanulate; lobes rounded-oval. *Herpestes rotundifolia* Pursh. *Bacopa rotundifolia* Wettst. Water: Ill—Va.—Tex.—Mont. *Plain.* Jl-S.

13. LIMOSÉLLA L. MUDWORT.

Low stemless, somewhat succulent annuals, or perennials by means of stolons. Leaves rosulate at the base, narrow, entire. Flowers perfect, solitary on scape-like peduncles. Calyx campanulate, 5-lobed. Corolla nearly regular, open-campanulate, 5-cleft. Stamens 4, with the short filaments adnate to the corolla-tube; anthers confluent 1-celled. Style short; stigma capitate. Capsule 2-celled at the base, 1-celled above, many-seeded. Seeds ovoid, rugulose.

Leaves petioled, with spatulate or oblanceolate blades.
Leaves linear-filiform, or subulate.

1. *L. aquatica*
2. *L. tenuifolia*

1. L. aquatica L. Small annual, with runners, leaf-blades 0.5-3 cm. long; glabrous; pedicels 0.5-3 cm. long; calyx 1-1.5 mm. long; teeth triangular, acute; corolla 2-2.5 mm. long, exserted, white or purplish. Water and mud: Lab.—Colo.—Calif.—B.C.; Eurasia. *Plain—Mont.* Je-O.

2. L. tenuifolia Wolf. Minute annual, with runners; leaves 1-3 cm. long; pedicels 1-2 cm. long; calyx 1-2 mm. long; lobes ovate, acute, corolla 2.5-3 mm. long. Mud and shallow water: Lab.—N.J.—N.M.—Calif.—B.C.; Eurasia and S. Am. *Plain—Mont.* Je-N.

14. GRATIOLA L. HEDGE HYSSOP.

Annual or perennial, somewhat succulent herbs. Leaves opposite, entire or toothed. Flowers solitary on axillary peduncles. Calyx usually subtended by 2 bractlets; sepals 5, nearly distinct. Corolla white, yellow, or purplish, 2-lipped. Stamens 2, included; staminodia 2, scale-like or filiform, or wanting; anthers sacs transverse, separated by a dilated membranous connective. Capsule globose or ovoid. Seeds striate.

Flowers without bracts

Flowers subtended by a pair of bracts similar to the calyx-lobes.

1. *G. ebracteata*
2. *G. virginiana*

1. G. ebracteata Benth. Stem 0.5-2 dm. high, leafy, glabrous or nearly so; leaves sessile, linear or lanceolate, 1-3 cm. long, entire or sparingly denticulate; sepals foliaceous, 6-8 mm. long, lanceolate; corolla yellowish, equalling the calyx. Wet places: B.C.—Mont.—n. Calif. *Submont.* Ap-Au.

2. G. virginiana L. Stem 1-2 dm. high, viscid-puberulent or glabrate below; leaves usually glabrous, oblong-lanceolate to linear, 1-5 cm. long, entire or denticulate, sessile; bractlets 2, linear, 5-6 mm. long; calyx about 5 mm. long; sepals lanceolate; corolla light yellow or nearly white, 8-10 mm. long. Mud and shallow water: Me.—Fla.—Calif.—B.C. *Plain—Submont.* My-O.

- Calyx about equally cleft in front and behind.
 Stem canescent.
 Stem tomentose-canescens; bracts entire, or trilobed, with broad rounded middle lobe. IV. INTEGRÆ.
 Stem strigose or hirsutulous-canescens, bracts 3-cleft, with linear lobes. V. SUBCINERÆÆ.
 Stem glabrous or pubescent, but not canescent.
 Leaves entire, rarely the uppermost slightly 3-lobed, corolla-lip very short and callous.
 Bracts usually entire and obtuse, oblong to obovate, broad, if 3-lobed with a broad middle lobe.
 Bracts tinged with crimson or rose. VI. RHEXIFOLIAE
 Bracts yellow with the very tips brown or red VII. LUTESCENTES.
 Bracts usually 3-cleft with lanceolate lobes, if entire very acute. VIII. LANCEIFOLIAE.
 Leaves, at least the upper, pinnately cleft, bracts also cleft, lower corolla-lip not callous, larger. IX. HISPIDAE.
 Galea less than 3 times as long as the lip, rarely half as long as the corolla-tube, bracts in most species tinged with yellow or brown.
 Leaves entire, bracts also entire or slightly 3-lobed. X. PALLIDAE.
 Leaves pinnately divided, at least the upper ones.
 Bracts slightly 3-lobed or entire, lobes truncate or rounded at the apex. XI. LUTEÆÆ
 Bracts deeply divided into lanceolate or linear-lanceolate lobes XII. LINEATAE.
 Whole plant white-woolly.
 Plant not white-woolly.
 Calyx about equally cleft in front and behind or deeper cleft behind.
 Lip of the corolla scarcely more than half as long as the galea, not decidedly saccate XIII. FASCICULATAE.
 Lip at least two-thirds as long as the galea, decidedly saccate XIV. PALLEScentes.
 Calyx much deeper cleft in front than behind
 Corolla 1.5-3 cm. long, slightly exceeding the calyx. XV. BRACHYANTHAE
 Corolla 4-5 cm. long, almost twice as long as the calyx XVI. SESSILIFLORAE.
- I. STENANTHAE
 One species. 1. *C. exilis*
- II. COCCINEAE.
 One species. 2. *C. coccinea*.
- III. LINARIAEFOLIAE.
 Bracts crimson or pink
 Plant low, caespitose, with several stems, about 2-3 dm high, leaves and bracts pinnately divided, inflorescence short and head-like 3. *C. collina*
 Plant tall, 4-10 dm. high, with a single or sometimes 2-3 stems, leaves entire or tho upper with 2-3 lobes, inflorescence elongate.
 Leaves all narrowly linear. 4. *C. linariaefolia*
 Upper leaves lanceolate 5. *C. cristagalli*
 Bracts yellowish or brownish
 Bracts cream-color, inflorescence villous-hirsute, with yellowish hairs. 6. *C. cognata*
 Bracts brownish, inflorescence villous, with short white hairs 7. *C. arcuata*.
- IV. INTEGRÆ
 Leaves entire.
 Bracts oblong. 8. *C. integra*
 Bracts obovate. 9. *C. gloriosa*
 Leaves pinnatifid. 10. *C. Lindheimeri*.
- V. SUBCINERÆÆ.
 One species. 11. *C. subcinerea*.
- VI. RHEXIFOLIAE
 Corolla 4-5 cm. long, nearly twice as long as the bracts 12. *C. magna*.
 Corolla 1.5-3.5 cm. long, little if at all surpassing the bracts
 Bracts scarlet or crimson, rarely pink
 Corolla about 3 cm long, stem 3-5 dm high
 Leaves narrowly lanceolate, bracts acute and usually deeply cleft 13. *C. confusa*
 Leaves, at least the upper ones, broadly lanceolate or oblong-ovate, bracts rounded at the apex, entire or with a very broad middle lobe and small lateral ones 14. *C. rhexifolia*
 Corolla 1.5-2 cm., rarely 2.5 cm. long; plant 2-3 dm high.
 Leaves lanceolate to linear.
 Stem and leaves glabrous or puberulent 15. *C. laeta*
 Stem and leaves viscid-pubescent. 16. *C. pinetorum*
 Leaves oblong, elliptic, or ovate-lanceolate
 Stem and leaves densely pubescent. 17. *C. Leonardi*.

Stem glabrous or puberulent; leaves finely puberulent.

Bracts brownish or yellowish.

18. *C. humilis*.
19. *C. brunnescens*.

VII. LUTESCENTES.

Leaves linear; corolla 2-3 cm. long.

Stem 2-3 dm. high; corolla scarcely longer than the calyx. 20. *C. dubia*.

Stem 3-5 dm. high, corolla decidedly longer than the calyx.

Calyx-lobes obtuse.

Calyx-lobes acute or acuminate.

Leaves lanceolate; corolla nearly 4 cm. long, calyx-lobes acute. 21. *C. desertorum*.

22. *C. lutescens*.

23. *C. variabilis*.

VIII. LANCEFOLIAE.

Corolla 3.5-4 cm. long, galea 1.5-2 cm. long, leaves lanceolate

Bracts brick-red or yellowish, leaves usually more or less pubescent

Bracts crimson, leaves glabrous or nearly so.

Corolla 3 cm. long or less

Calyx and upper part of the stem densely white-villous.

Calyx and upper part of the stem sparingly hirsute-villous

Plants growing more or less in clumps, with a short caudex.

Corolla 2-3 cm. long, bracts usually more or less crimson.

Plant tall, 4-6 cm. high, calyx-lobes acute or acuminate.

Galea 15-18 mm. long.

Galea about 10 mm. long.

Plant low, 1-3 dm. high, calyx-lobes obtuse

Corolla less than 2 cm. long, bracts brick-red.

Plants with solitary stems from horizontal or ascending rootstocks

23. *C. variabilis*.
24. *C. Vreelandii*.

25. *C. trinervis*.

13. *C. confusa*.

26. *C. Tweedyi*.

27. *C. subpurpurea*.

28. *C. mineata*.

29. *C. lanceifolia*.

IX. HISPIDAE.

Calyx-lobes rounded at the apex; bracts purplish, much exceeding the flowers.

Calyx-lobes acute or rarely obtuse at the apex, bracts if at all only slightly exceeding the flowers

Corolla about 4 cm. long

Plant simple, with a horizontal rootstock; galea longer than the corolla-tube.

Plant caespitose, with a short caudex; galea not longer than the corolla-tube.

Corolla 1.5-3 cm. long, plant more or less caespitose, with a short caudex

Stem more or less pubescent, 3-6 dm. high

Lobes of the calyces and bracts lanceolate or oblong; bracts usually crimson.

Body of the leaves lanceolate, lobes directed forward

Plant decidedly glandular or viscid-pubescent

Plant scarcely viscid, but puberulent and hirsute

Corolla much exceeding the bracts, galea equalling or exceeding the tube

Corolla slightly if at all exceeding the bracts, galea shorter than the tube

Bracts with very short lobes or merely toothed, stem sparingly hirsute or merely puberulent.

Bracts with long narrow lobes; stem copiously hirsute

Body of the leaves linear, the lobes linear, divergent

Galea shorter than the corolla-tube

Galea longer than the corolla-tube

Lobes of the calyces and bracts narrowly linear, bracts brick-red.

Stem glabrous up to the inflorescence, 1-2 dm. high

30. *C. obtusiloba*.

31. *C. Suksdorfii*.

13. *C. confusa*.

32. *C. viscida*.

33. *C. amplifolia*.

34. *C. Bradburyi*.

35. *C. hispida*.

36. *C. angustifolia*.

37. *C. chromosa*.

38. *C. linearis*.

39. *C. Haydeni*.

X. PALLIDAE.

Upper leaves long-acuminate, caudate-falcate.

Stem up to the inflorescence and leaves puberulent or glabrate.

Stem and leaves pilose

Upper leaves neither caudate, nor falcate

Bracts not pale-yellow, corolla usually less than 2 cm. long.

Stem slender, 2-4 dm. high, bracts rose or brownish.

Stems from a rootstock, sparingly villous

Stems from a caudex, hirsutulous, or villous in the inflorescence

Stem 0.5-2 dm. high, from a caespitose caudex.

Bracts puberulent, dark brownish scarlet.

Bracts villous, varying from light brownish crimson to greenish yellow.

Bracts pale yellow; corolla usually over 2 cm. long, except in the first

Plant 0.5-2 dm. high, densely villous above.

Plant 2-4 dm. high, slightly if at all villous in the inflorescence.

40. *C. pallida*.

41. *C. Cusickii*.

42. *C. gracillima*.

43. *C. Bennittii*.

44. *C. parvula*.

45. *C. occidentalis*.

- Stems solitary from a creeping rootstock, corolla usually margined with yellow;
 plant darkening in drying 46 *C. luteovirens*
 Stems growing in clumps, with a short caudex, plant rarely darkening in dry-
 ing 47 *C. sulphurea*
 Upper leaves broadly lanceolate or ovate, all leaves 3-ribbed 48 *C. wyomingensis*
 Leaves all linear, 1-ribbed, or the uppermost linear-lanceolate and indis-
 tinctly 3-ribbed

XI LUTEAE

- Plant seldom over 1 dm. high; bracts green or tinged with brownish rose; calyx with
 short obtuse lobes
 Stem less than 2 dm. high, sparingly villous, bracts tinged with brown 49 *C. pulchella*
 Stem 2-3 dm. high, hirsutulous, bracts tinged with rose 43 *C. Bennettii*
 Plant 2-4 dm. high, bracts pale yellow 50. *C. lutea*
 Stems villous, leaves lanceolate 41. *C. Cusickii*
 Stems pilose, leaves linear or lance-linear

XII LINEATAE

- One species 51 *C. lineata*.

XIII FASCICULATAE.

- Bracts rhombic-obovate or broadly cuneate in outline, almost pectinately divided 52 *C. Pecten*
 Bracts ovate or lanceolate in outline, pinnatifid 48. *C. wyomingensis*
 Upper leaves and bracts, only 3-fid at or above the middle 53 *C. fasciculata*
 Leaves and bracts deeply divided into linear divisions

XIV PALLESCENTES.

- Plant low, less than 2 dm. high, finely puberulent 54 *C. pallescens*
 Plant 1.5-3 dm. high, hirsute or villous as well as puberulent 55 *C. longispica*
 Lateral divisions of the calyx deeply cleft into two subulate lobes, corolla 12-15 mm.
 long
 Lateral divisions of the calyx merely 2-toothed 56 *C. pitifera*
 Lower lip two-thirds as long as the galea, corolla about 2.5 cm. long
 Lower lip almost equalling the galea, corolla about 2 cm. long

XV BRACHYANTHAE

- Corolla 2-3 cm. long; stem glabrous or nearly so 6 *C. cognata*
 Corolla 1.5-2.5 cm. long, stem pubescent 57 *C. puberula*
 Lower lip of the corolla fully half as long as the galea; plant less than 1 dm. high.
 Lower lip one-fifth to one-third as long as the galea, plant 3-4 dm. high
 Lower lip about one-third as long as the galea, its lobes lanceolate, acuminate
 Stem 5-8 dm. high, finely puberulent, bracts minutely puberulent 58 *C. cernua*
 Stem 2-4 dm. high, more or less hirsute-villous, bracts shortly villous-hirsute 59 *C. brachyantha*
 Lower lip one-fifth to one-fourth as long as the galea, its lobes ovate, acute 60 *C. flava*

XVI. SESSILIFLORAE.

- One species. 61 *C. sessiliflora*.

1. *C. exilis* A. Nels. Stem strict, 3-8 dm. high, more or less glandular-hirsute or villous; leaves linear-lanceolate or lanceolate, long-attenuate, 3-10 cm. long, 3-nerved, more or less glandular-hirsute; inflorescence long, spike-like; bracts linear-lanceolate, attenuate, only the uppermost tipped with scarlet or crimson; calyx more deeply cleft above than below, about equalling the corolla; lobes linear-lanceolate; corolla about 2 cm. long, yellowish or tinged with pink on the margins; galea about 7 mm. long, obtuse; lip less than 2 mm., 3-cleft, with obtuse lobes. *C. stricta* Rydb., not DC. In swampy places, especially in saline soil: Wash.—Nev.—Colo.—Mont. *Plain—Mont.* Jl—Au.

2. *C. coccinea* (L.) Spreng. Stem usually simple, 3-6 dm. high, more or less short-villous; leaves of the basal rosette, oblong or obovate, entire, 2-5 cm. long; stem-leaves 3-8 cm. long, with 3-7 linear, obtuse divisions; bracts 3-5-cleft, tipped with crimson; lateral lobes usually lanceolate, acute, or obtuse, the middle one broadly oblong, rounded at the apex; calyx 1.5-2 cm. long, almost equally deeply cleft above and below, into two oblong, truncate or retuse divisions; corolla greenish yellow, about 2 cm. long; galea about 8 mm. long, rounded at the apex; lower lip about 3 mm. long. Meadows and thickets. Me.—N.C.—Tex.—Sask. *Plain.* My—Jl.

3. *C. collina* A. Nels. Stems many, puberulent and with scattered white villous hairs; leaves 2-4 cm. long, dark green, divided into linear divisions, puberulent; bracts green below, scarlet above the middle, usually twice cleft into linear or oblong divisions; calyx sparsely soft-pubescent, about 2 cm. long; corolla greenish, with crimson margins, nearly 3 cm. long; galea about 1.5 cm. long; lip about 2 mm. long. Gravelly ridges and among sage-brush: Wyo.—Colo. *Plain—Submont* My-Je.

4. *C. linariaefolia* Benth. Stems glabrous or somewhat villous in the inflorescence; leaves narrowly linear or dissected into narrow, linear divisions, dark green, glabrous or nearly so, 5-10 cm. long; bracts 3-5-parted into linear-lanceolate or almost subulate divisions, more or less crimson and villous; calyx 3-4 cm. long, more or less villous; corolla 4-5 cm. long, greenish yellow, tinged with scarlet; galea about 2 cm.; lip saccate, about 4 mm. long. Hills and rocky places: Wyo.—N.M.—Ariz.—Calif.—B.C. *Submont.—Mont.* Jl-S.

5. *C. Crista-galli* Rydb. Stems about 4 dm. high, finely pilose throughout or more or less villous above; lower leaves linear or linear-lanceolate, 5-8 cm. long, 3-nerved, finely pubescent, the upper often divided into 3-5 oblong-linear divisions; bracts coccineous, 3-5-cleft, the middle lobe broad, oblong, acutish; calyx 2-2.5 cm. long, coccineous above; corolla about 3.5 cm. long, green and tinged with red; galea 13-15 mm. long; lip saccate, 2 mm. long. Mountain sides: Mont—Colo. *Submont.—Mont.* Je

6. *C. cognata* Greene. Stem strict, about 1 m. high, glabrous below, villous in the inflorescence; leaves nearly all entire, linear, 3-5 cm. long, glabrous or nearly so; bracts 3-cleft, with linear-lanceolate divisions, tinged with cream-color; calyx about 2 cm. long, villous; corolla 2.5 cm. long, greenish yellow; galea about 12 mm. long; lip saccate, 2 mm. long. Mountains of Colo. *Submont.—Mont.* Jl.

7. *C. arcuata* Rydb. Stems erect, strict, usually simple, 2-4 dm. high, shining, glabrous or short-villous in the inflorescence; leaves narrowly linear, 2-6 cm. long, 1-3 mm. wide, glabrous or the lower sparingly white-villous; bracts 3-cleft with lanceolate lobes; calyx 12-15 mm. long; corolla 2.5-3 cm. long, at last strongly curved, greenish, with yellow margins; galea 12-15 mm. long; lip about 3 mm. long. Mountain sides: c Utah. *Mont.—Subalp.*

8. *C. integra* A. Gray. Stems several, simple, tomentose-canescens, 2-4 dm. high; leaves entire, narrowly linear, more or less tomentulose-canescens, thick, inflorescence short and dense, bracts tomentose, crimson, rose-colored, pink, or even yellowish; calyx tomentulose, 2.5 cm. long; corolla green, with crimson margins, about 3 cm. long; galea 10-15 mm. long; lip 2 mm. long; lobes minute. Dry plains and table-lands: Colo.—N.M.—Ariz.—n Mex. *Plain—Mont.* My-S.

9. *C. gloriosa* Britton. Stems tomentose-canescens, 2-3 dm. high; leaves narrowly linear, canescens, 3-6 cm. long; inflorescence short and dense; bracts obovate, 4-5 cm. long, 2-2.5 cm. wide, rounded at the apex, crimson, somewhat canescens, entire, or 3-cleft with a broad middle lobe; calyx 3-4 cm. long, somewhat canescens; corolla about 4 cm. long, green, with crimson margins; galea about 2 cm. long; lip about 2 mm. long; lobes very short. Dry places: Ariz.—s Colo.—N.M.; n Mex. Mr-Jl.

10. *C. Lindheimeri* A. Gray. Stems several, 1-3 dm. high, hirsute or villous-canescens; leaves dissected into 3-5 linear divisions, canescens, 3-5 cm. long; inflorescence dense; bracts rose-colored or brick-red, 3-5-cleft, with oblong, obtuse divisions; calyx about 1.5 cm. long; corolla about 3 cm. long, green, with pink margins; galea about 1.5 cm. long; lip 3-4 mm. long. (?) *C. scabrada* Eastw. Dry places: w Tex.—s Colo. *Plain—Submont.* Ap-Jl.

11. *C. subcinerea* Rydb. Stem 3-5 dm. high, canescens-strigose; leaves canescens, 3-ribbed, 5-7 cm. long, the lower entire and linear, the upper 3-cleft; bracts broadly cuneate, 5-7-cleft, the upper tinged with yellow and brown-tipped; calyx 2.5 cm. long; corolla greenish yellow; galea 9 mm. long; lip 3.5 mm. long, slightly saccate. Dry mountain sides: Ida.—Mont. *Submont.—Mont.*

12. *C. magna* Rydb. Stem a meter or so high, glabrous and shining, angled; leaves lanceolate, 4-6 cm. long, glabrous, 5-ribbed and reticulate, more or less acuminate; inflorescence short and dense; bracts ovate, entire, tipped with crimson; calyx about 2.5 cm. long; corolla 4-5 cm. long, greenish, tinged with crimson and with crimson margins; galea fully 2 cm. long; lip about 3 mm. long. Woods: B.C. *Mont.*

13. *C. confusa* Greene. Stems glabrous below, villous above, 4-6 dm. high; leaves lanceolate or linear-lanceolate, 4-7 cm. long, acute or acuminate, 3-ribbed, glabrous or puberulent, entire or the uppermost 3-lobed; bracts ovate, entire to 5-lobed; calyx about 2 cm. long; corolla about 3 cm. long; galea 13-14 mm. long; lip about 4 mm. Mountains: Colo.—N M. *Submont.*—*Subalp.* Je-Jl.

14. *C. rhexifolia* Rydb. Stem 3-6 dm. high, usually glabrous below, more or less villous above; leaves oblong-lanceolate to ovate, 3-5-nerved, about 5 cm. long, from glabrous to densely puberulent; bracts crimson, scarlet or rose; calyx about 2.5 cm. long, green below, colored above; corolla about 3 cm. long, puberulent, green and tinged and bordered with crimson or scarlet; galea about 1 cm. long, lip about 4 mm. long. Open woods and mountain sides: Alaska—Utah—Colo.—Sask. *Submont.*—*Subalp.* Je—Au.

15. *C. lauta* A. Nels. Stems several, glabrous or puberulent; leaves 2-5 cm. long, the lower linear-lanceolate, acuminate, the upper lanceolate; inflorescence short and dense; bracts ovate or obovate, entire or 3-cleft, with a broad middle lobe, villous-ciliate, tipped with crimson; corolla yellowish green, margined with crimson, 18-22 mm. long; galea 7-8 mm. long; lip about 2 mm. long. *C. oreopala subintegra* Fern. Moist mountain slopes. Ore.—Utah—Colo.—Mont. *Submont.*—*Subalp.* Je—Au.

16. *C. pinetorum* Fern. Stem slender, 3-4 dm. high, viscid-pilose; leaves linear-lanceolate, 3-5 cm. long, minutely pilose; inflorescence narrow; lower bracts entire, the upper 3-5-cleft, roseate or bright red above; calyx about 18 mm. long; corolla about 2.5 cm. long; galea about equalling the tube; lip 2 mm. long; lateral lobes longer than the middle one. Pine woods: Ore.—Ida.—Nev.—Calif. *Mont.* Jl—Au.

17. *C. Leonardi* Rydb. Stems several, 2-3 dm. long, more or less viscid-villous; leaves ovate-lanceolate or oblong-lanceolate, 1.5-3 cm. long, densely puberulent, 3-ribbed; bracts broadly ovate or obovate, rounded at the apex, densely pubescent, entire, tipped with crimson; calyx 1.5 cm. long, densely puberulent; corolla 2 cm. long or less, densely puberulent; galea about 1 cm. long; lower lip about 2 mm. long. Mountains: Utah. *Mont.* Jl—Au.

18. *C. humilis* Rydb. Stems several, about 2 dm. high, glabrous below, somewhat viscid-pubescent above; leaves oblong to elliptic-lanceolate or the uppermost ovate, 2-3 cm. long, obtuse or acute, finely puberulent; bracts entire, obovate, tipped with dark crimson; inflorescence short and dense; calyx densely puberulent, 10-12 mm. long; corolla about 15 mm. long, densely puberulent, greenish, with purple margins; galea 7-8 mm. long; lip 2 mm. long. Moist sub-alpine woods: Wyo.—Utah. *Mont.*—*Subalp.*

19. *C. brunnescens* Rydb. Stems 3-5 dm. high, more or less pubescent and purplish; leaves narrowly linear-lanceolate, more or less distinctly 3-nerved, 4-5 cm. long, finely pubescent; bracts ovate to oblong-lanceolate, obtuse or rounded at the apex, entire or with a short tooth on each side; calyx about 2 cm. long; corolla about 3 cm. long; galea about 1 cm. long; lip about 3 mm. Mountains, along streams: Colo.—Wyo.—Utah. *Submont.*—*Subalp.* Jl—S.

20. *C. dubia* A. Nels. Stems several, 2-3 dm. high, finely puberulent and with some white soft hairs; leaves linear, 3-5 cm. long, usually with one or two pairs of divergent linear lobes; bracts with three relatively broad lobes, decidedly yellowish, or at tips bright yellow; calyx about 2 cm. long; corolla scarcely longer; galea equalling the tube; lip very short, minutely toothed. *C. angustifolia dubia* A. Nels. Denuded slopes: Wyo. *Son.*

21. *C. desertorum* Geyer. Stems several, 3-5 dm. high, retrorsely pubescent, yellowish hirsute above; leaves linear-acuminate, hirsute, 3-ribbed, 4-5

cm long, the upper usually 3-cleft; inflorescence dense and short; bracts lanceolate or ovate, usually 3-cleft; calyx 2–2.5 cm. long; corolla 3 cm. or nearly so, pubescent; galea 12 mm. long; lip 3 mm. long. Meadows: Mont.—Ida.—Wash. Submont. My.

22. *C. lutescens* (Greenm.) Rydb. Stems 3–5, 5 dm. high, more or less hirsute and puberulent; lower leaves linear or linear-lanceolate, entire, scabrous-puberulent and somewhat hirsute, 3-ribbed, the upper broader, 3-cleft and 5-ribbed; bracts ovate, 3-cleft, upper portion yellow and the tips often brown or red; calyx about 15 mm. long; corolla 2–2.5 cm. long; galea about 1 cm. long; lip 2 mm. long. *C. pallida lutescens* Greenm. Hills: Wash.—Ida.—Mont. Submont. My-Je.

23. *C. variabilis* Rydb. Stems pubescent, 4–8 dm. high; leaves linear-lanceolate or lanceolate, 4–6 cm. long, 3-ribbed, puberulent and more or less short-hirsute; bracts lanceolate, deeply 3-cleft, yellow above, with scarlet or brick-red tips or sometimes almost wholly brick-red; calyx viscid-villous, about 2.5 cm. long, tinged with yellow; corolla yellowish-green, with scarlet or yellow margins, about 4 cm. long; galea nearly 2 cm. long; lip dark green, 3 mm. long. Mountains. Utah. Mont.—Subalp. Jl-Au.

24. *C. vreelandii* Rydb. Stem usually single, 6–8 dm. high, glabrous or nearly so, shining; leaves lanceolate, 3–5-ribbed, glabrous or nearly so, 4–6 cm. long, somewhat acuminate; bracts lanceolate, usually 3-lobed, with acute lobes, tipped with crimson; calyx 2–2.5 cm. long, tinged with crimson; corolla dark green, with purplish margins; galea about 2 cm. long; lower lip 2 mm. long. Banks, open woods, and meadows: Mont.—Wyo.—Utah—Wash. Submont. Je-Jl.

25. *C. trinervis* Rydb. Stem more or less villous, 3–6 dm. high; leaves dark green, finely puberulent, entire, acute, usually 3-ribbed, the lower linear, 5–8 cm. long and about 0.5 cm. wide, the upper lanceolate and often 15 mm. wide, bracts 3–5-lobed, the upper with almost crimson tips; calyx densely white villous, about 3 cm. long; corolla about 4 cm. long, green, but the galea with crimson margins; galea about 15 mm. long; lip 4–5 mm. long, dark green, with three narrow lobes. Open woods: Colo. Mont. Je-Jl.

26. *C. Tweedyi* Rydb. Stems 2–5 dm. high, finely puberulent or sometimes glabrate; leaves linear-lanceolate, 3-nerved, 3–6 cm. long, the upper somewhat broader and sometimes lobed; bracts light green, tipped with scarlet or brick-red; calyx about 2 cm. long; corolla about 2.5 cm. long, greenish, margined with red; galea 1 cm. long or less; lip 3 mm. long. Valleys and hillsides: B.C.—Wash.—Utah—Wyo.—Mont. Submont.—Mont. Je-Au.

27. *C. subpurpurascens* Rydb. Stems several, 1–3 dm. high, glabrous or slightly puberulent, villous above; leaves narrowly linear, finely puberulent, 3–5 cm. long, 2–3 mm. wide; inflorescence short and dense; bracts lanceolate, acute or obtuse, the lower usually entire, the upper more or less cleft, tipped with crimson; calyx 15–20 mm. long, especially towards the base; corolla 2.5–3 cm. long, green, with crimson margins; galea about 1 cm. long; lower lip 3 mm. long. *C. purpurascens* Rydb., not Greenm. Hillsides: Alta.—Mont. Submont.—Mont.

28. *C. mineata* Benth. Stems many, 4–6 dm. high, sparingly pubescent; leaves linear-lanceolate or linear, acuminate, 5–7 cm. long, sparingly pubescent; bracts lanceolate, 3-cleft, tipped with scarlet or brick-red; calyx about 15 mm. long, more or less hirsute; corolla about 2 cm. long, green, margined with red; galea about 1 cm. long; lip dark green, 2.5 mm. long. Meadows: Wash.—Ida.—Mont.—Sask. Submont. Jl-Au.

29. *C. lancifolia* Rydb. Stems solitary, 4–6 dm. high, sparingly villous or glabrate; leaves lanceolate, often acuminate, 3–5 cm. long, 3-ribbed, usually all entire, usually glabrous, but sometimes finely puberulent; bracts lanceolate, acute or acuminate, often more or less cleft, crimson; calyx hirsute and puberulent, equally cleft, 2.5 cm. long; lobes lanceolate, 5 mm. long; corolla about 3 cm. long, puberulent, green, with crimson margins; galea 12–15 mm. long; lower lip 3 mm. long. Valleys and hillsides: Alaska—Ore.—Utah—Colo.—Alta. Submont.—Subalp. Je-Au.

2 cm. long; corolla 2-2.5 cm. long; galea about 6 mm. long; lip nearly half as long. Dry ground: B.C.—Wash. *Submont.* Je—Au.

59. *C. brachyantha* Rydb. Stems 2-4 dm. high, puberulent and more or less villous-hirsute especially below; leaves narrowly linear or cleft, with linear divisions, 2-5 cm. long, puberulent; bracts 3-5-cleft into linear divisions, tipped with yellowish; calyx more or less villous; corolla 15-20 mm. long; galea 7-8 mm. long; lip about 3 mm., gibbous. *C. breviflora* A. Gray. Mountains: Colo.—Wyo. *Plain—Mont.* Je—Au.

60. *C. flava* S. Wats. Stems puberulent and more or less villous-hirsute, especially below, 3-5 dm. high; leaves narrowly linear, entire or dissected into a few linear lobes, finely puberulent; bracts 3-cleft, with linear divisions, puberulent and villous-ciliate; calyx about 15 mm. long; corolla 2-2.5 mm. long, yellow; galea 8-10 mm. long; lower lip scarcely 2 mm. long, greenish. Dry soil, especially among sage-brush: B.C.—Ida.—Utah—Colo.—Mont. *Submont.—Mont.* Je—Au.

61. *C. sessiliflora* Pursh. Stems 1-3 dm. high, more or less densely villous; leaves entire, linear or dissected into linear lobes. 3-5 cm. long, puberulent; bracts broader, 3-cleft, with lanceolate or linear-lanceolate divisions, finely canescent; calyx 3-4 cm. long; corolla 4-5 cm. long, yellow, puberulent; galea 10-15 mm.; lip about 5 mm. long. Dry plains and hills: Ill.—Mo.—Tex.—Ariz.—Sask. *Plum.* Je—Au.

20. ORTHOCARPUS Nutt. OWL'S CLOVER.

Annual caulescent herbs. Leaves alternate, sessile, pectinately cleft or entire, those subtending the flowers usually highly colored. Flowers perfect in terminal leafy spikes. Calyx tubular or deeply campanulate, nearly equally 4-cleft. Corolla very irregular, 2-lipped; upper lip erect, slightly arched, equalling or slightly shorter than the more or less 3-lobed saccate lower lip. Stamens 4, didynamous, ascending under the upper lip; anther-sacs dissimilar, the outer one attached by its middle, the inner pendulous by its apex. Styles wholly united, slender; stigmas entire. Capsule oblong, loculicidal. Seeds many, reticulate.

Bracts dilated, entire or with a broad middle lobe and narrow lateral ones, somewhat petaloid. 1. *O. tenuifolius*.

Bracts herbaceous, resembling the leaves, 3- (rarely 5-) cleft, with lanceolate lobes.

Corolla yellow, spike dense; seeds ridged.

Plant hirsute, corolla not three times as long as the calyx. 2. *O. luteus*.

Plant puberulent, corolla 3-4 times as long as the calyx 3. *O. Tolmiei*.

Corolla white, turning rose-purple, spike lax, seeds loosely reticulate

4. *O. purpureo-albus*.

1. *O. tenuifolius* Benth. Stem 1-2 dm. high, simple or branched above, somewhat hirsute, purplish; leaves usually dissected, with linear-filiform or subulate divisions, puberulent and sparingly hirsute; lower bracts leaf-like, usually 5-cleft, hirsute-ciliate; middle lobe lanceolate and the lateral ones subulate; upper bracts with an oblong to oval purple-tipped and rounded middle lobe; calyx about 1 cm. long, its lobes subulate; corolla about 2 cm. long, wholly yellow or purplish at the apex; galea about 5 mm. long; lip 4 mm., only slightly gibbous. Plains and bench lands: B.C.—Wash.—Ida. *Plain—Submont.* Je—Au.

2. *O. luteus* Nutt. Stem 1-4 dm. high, more or less hirsute, strict; leaves narrowly linear-lanceolate to almost subulate, entire, or rarely 3-cleft, attenuate, 1.5-5 cm. long; bracts 3-5-cleft, with lanceolate acute divisions, puberulent; calyx 5-6 mm. long, hirsute; its lobes lanceolate, about 1 mm. long; corolla yellow, 10-15 mm. long; galea and lip nearly 5 mm. long, lip slightly gibbous. Sandy soil: B.C.—Wash.—Ariz.—N.M.—Neb.—Sask. *Submont.—Mont.* Je—Au.

3. *O. Tolmiei* H. & A. Stem 2-4 dm. high, puberulent; leaves narrowly linear-lanceolate, usually entire, 2-5 cm. long; bracts usually 3-cleft, puberulent, with linear-lanceolate or subulate divisions; calyx 4-5 mm. long, its lobes lanceolate; corolla 15-18 mm. long, yellow or tipped with brownish or purplish; galea about 5 mm. long; lip slightly shorter, deeply gibbous. Pastures and mountain valleys: Ida—Utah—Wyo. *Submont.—Mont.* Jl—S.

4. *O. purpureo-albus* A. Gray. Stem strict, somewhat viscid, puberulent, 3-5 dm. high; leaves narrowly lance-linear to almost filiform, usually entire; bracts 3-cleft to near the base into linear-lanceolate attenuate divisions; calyx about 6 mm. long; its lobes linear-lanceolate, acuminate; corolla about 15 mm. long; galea about 6 mm. long; lip 5 mm. long, only slightly gibbous. Mountains and table lands: Ida.—Ariz.—N.M.—Colo.—*Submont.*—*Mont.* Jl—Au.

21. *TRIPHYSARIA* (Benth.) Rydb. PELICAN FLOWER, JOHNNY-TUCK.

Annual caulescent herbs. Leaves alternate, often pectinate, or else entire, those subtending the flowers usually colored. Flowers perfect, in terminal leafy spikes. Calyx deeply 4-cleft. Corolla irregular, 2-lipped; upper lip erect, straight, narrow, much shorter than the lower, which is 3-lobed and strongly 3-saccate. Stamens 4, didynamous, ascending under the upper corolla-lobe; anther-sacs solitary or two and then dissimilar in the manner of the two preceding genera. Stigma capitate or sometimes 2-lobed. Capsule oblong, loculicidal; seeds many, reticulate.

1. *T. hispida* (Benth.) Rydb. Stem 2-3 dm high, soft-hirsute, strict, simple; leaves with linear-lanceolate, attenuate divisions, or the lower entire, soft-hirsute; spike leafy; bracts similar to the leaves; calyx-lobes subulate; corolla white, 15-18 mm. long, viscid-puberulent; lip saccate, 2-3 mm. deep; galea subulate. Low ground: Wash.—Ida.—Nev.—n Calif. *Submont.* My—Jl.

22. *ADENOSTEGIA* Benth.

Branching annuals. Leaves narrow, alternate. Flowers perfect, in leafy spikes at the ends of the branches. Calyx cleft to the base on the sides and therefore 2-leaved, or sometimes 1-leaved by the want of the lower division. Corolla tubular, with a funnellform throat, slightly 2-lipped; the upper lip narrow, entire; the lower round, slightly 3-toothed or entire. Stamens 4, didynamous, or sometimes the shorter pair wanting. Styles wholly united, with an inflexed apex; stigma entire. Capsule compressed, loculicidal. Seeds few. [*Cordylanthus* Nutt]

Calyx diphyllous, flowers short-pedicelled, with 2-4 bractlets, flowers in head-like spikes. Stamens 4, anthers 2-celled; both divisions of the calyx 5-6-ribbed, leaves 3-7-parted.

Bracts as well as the whole plant puberulent.

Corolla 2.5 cm. long, more purplish

Corolla 12-20 mm long, dull yellow.

Bracts ciliate with long white, more or less curled, hairs

1 *A. Wrightii*

2 *A. ramosa*

3 *A. ciliosa*

4 *A. bicolor*

Stamens 2, anthers 1-celled; posterior division of the calyx only 2-ribbed; leaves narrowly linear, entire, except those subtending the heads

Calyx monophyllous, the anterior division lacking; flowers sessile without bractlets; flowers in more elongate spikes

Leaves and bracts all entire, anthers of the shorter stamens with only the smaller lower sacs

5 *A. canescens*.

Leaves 3-5-parted; anthers of all the stamens 2-celled.

6 *A. Kingii*

1. *A. Wrightii* (A Gray) Greene. Stems puberulent, or almost glabrous, 3-6 dm. high; leaves 3-5-parted into filiform divisions, sparingly puberulent; bracts similar to the leaves; calyx about 2 cm. long or more; corolla usually exerted; galea nearly 1 cm. long; lips slightly shorter. *Cordylanthus Wrightii* A. Gray. Dry places and sandhills: w Tex.—s Colo.—Utah—Ariz. Son. Jl—O.

2. *A. ramosa* (Nutt.) Greene. Stem much branched, finely puberulent, 1-4 dm. high; leaves dissected into filiform divisions, grayish puberulent; bracts similar; calyx 12-20 mm. long; galea 6-8 mm. long; lip about 5-6 mm. long. *C. ramosus* Nutt. In dry places: Ore.—Nev.—n Colo.—Wyo. *Submont.*—*Mont.* Je—Au.

3. *A. ciliosa* Rydb. Stem puberulent, purplish, 1.5-2 dm. high; leaves 2-3 cm. long, finely puberulent, 3-5-cleft into filiform divisions; bracts similar to the leaves but with broader bases; calyx nearly 1.5 cm. long, more or less ciliate; corolla about 15 mm. long; galea 5-6 mm. long; lip nearly as long, pubescent without. Slopes and plains: Wyo.—Ida. *Submont.* Jl—Au.

4. *A. bicolor* (A. Nels.) Rydb. Stem 2-5 dm. high, softly pilose and glandular-viscid; leaves usually entire, narrowly linear or 3-5-divided, softly pilose and viscid; bracts usually 3-cleft with linear divisions; calyx usually more or less scarious, purplish, villous; upper division about 1 cm. long, 2-ribbed and 2-lobed at the apex; lower division oblong, 3-ribbed; corolla purplish, nearly 15 mm. long; galea about 4 mm. long; lip about 3 mm. long. *Cordylanthus bicolor* A. Nels. Low grounds and hillsides: Nev.—Ida. *Submont.* Jl-S.

5. *A. canescens* (A. Gray) Greene. Stem strict, branched, villous or glabrous below, densely villous above; leaves entire, linear-lanceolate, 1-3 cm. long, more or less villous; bracts lanceolate, 1.5-2 cm. long, softly-villous, 1-3-ribbed; upper division of the calyx 15-20 mm. long, softly villous, with 2 principal ribs; corolla nearly 2 cm. long, puberulent; galea about 7 mm. long; lip nearly as long. Saline soil: Calif.—Utah. *Son.* Jl-Au.

6. *A. Kingii* (S. Wats.) Greene. Stem erect, branched, 1-3 dm. high, more or less glandular-pubescent; leaves 3-cleft, 3-4 cm. long, with narrowly linear divisions; bracts 3-5-cleft, clasping; upper division of the calyx lanceolate, 2-3-toothed at the apex, about 2 cm. long; corolla 1.5-2 cm. long, purple, pubescent; galea 8-10 mm. long, little exceeding the 3-toothed lip. *C. Kingii* S. Wats. Limestone ridges: Nev.—sw Colo. *Son.—Submont.* Jl.

23. EUPHRASIA (Tourn.) L. EYEBRIGHT.

Low herbs, parasitic on other plants. Leaves opposite, dentate or incised. Flowers perfect, small, in terminal leafy spikes. Calyx 4-cleft, or rarely 5-cleft and with one lobe smaller than the other 4. Corolla very irregular, 2-lipped; upper lip 2-lobed, the margins recurved; lower lip much larger, 3-lobed, spreading. Stamens 4, didynamous, ascending under the upper lip; anther-sacs equal, parallel. Capsule oblong, loculicidal. Seeds many, oblong, longitudinally ribbed.

Bracts with acute or obtuse teeth

Teeth of the bracts obtuse, corolla 5-6 mm. long; inflorescence capitate

1 *E. mollis*.

Teeth of the bracts acute; corolla 4.5-5.5 mm. long, inflorescence becoming spicate.

2 *E. disjuncta*.

Bracts with subulate or bristle-tipped teeth.

3 *E. hudsonica*.

1. *E. mollis* (Ledeb.) Wettstein. Stem 4-10 cm. high, mostly simple; leaves 8-15 mm. long, ovate, coarsely crenate-dentate, densely pubescent; spike head-like when young, at last with 1-3 lower bracts remote; calyx densely pilose; corolla 5-6 mm. long, like that of the next species but deeper purple. Grassy banks: Alaska—Yukon—Mont.—B.C.; e Siberia. *Subarctic.* Au.

2. *E. disjuncta* Fern. & Wieg. Stem slender, 6-30 cm. high, branched below, puberulent; leaves ovate or orbicular, 8-18 mm. long, crenate-dentate; spike interrupted, at last 5-25 cm. long; bracts large, coarsely dentate; corolla 4-5.5 mm. long, with a yellow eye; upper lip purple, the lower white, with purple lines. Open places: Lab—Me.—Alta.—Alaska. *Subarctic.* Je-S.

3. *E. hudsonica* Fern. & Wieg. Stem 5-20 cm. high, pubescent, simple or branched below, leaves oblong, 10-15 mm. long, sparingly pubescent, with few acute teeth; spike elongate, at last 5-15 cm. long; bracts oblong, 7-15 mm. long; corolla 5.5-6 mm. long, whitish, with pale violet lines. Grassy places: Hudson Bay—Alta—Mack. *Subarctic.* Au.

24. ELEPHANTÉLLA Rydb. LITTLE RED ELEPHANT, ELEPHANT'S HEAD, ELEPHANT FLOWER.

Perennial herbs, with rootstocks, blackening in drying. Leaves alternate, pinnately divided, with toothed segments. Flowers perfect, in terminal spikes. Calyx obliquely campanulate, 5-toothed. Corolla 2-lipped; upper lip strongly arcuate, produced into a long filiform upcurved beak, enclosing the long style; lower lip 3-lobed, the lateral lobes reflexed. Stamens 4, didynamous, ascending under the upper lip; anthers approximate in pairs; sacs transverse, parallel. Capsule compressed, beaked, loculicidal.

1. *E. groenlandica* (Retz.) Rydb. Stem 2-6 dm. high, glabrous; leaves petioled, or the upper sessile, lanceolate in outline, pinnatifid, 5-20 cm. long; lobes linear or lanceolate, doubly dentate; spike dense, 1-3 dm. long; calyx glabrous, 5-7 mm. long; teeth triangular-ovate; corolla proper reddish-purple or claret-colored, about 1 cm. long, the long curved beak 12-15 mm. long. Swamps and wet meadows: Greenl.—Lab.—N.M.—Calif.—Alaska. *Mont.*—*Subalp.* Je—Au.

25. *PEDICULARIS* (Tourn.) L. LOUSEWORT, INDIAN WARRIOR,
DUCK-BILL.

Perennial (all ours) or annual herbs. Leaves alternate, opposite or whorled, pinnately veined, pinnatifid, lobed, or merely crenate. Flowers perfect, in terminal spikes or racemes. Calyx cleft on the lower side, 2-5-lobed. Corolla strongly 2-lipped; upper lip laterally compressed, sometimes short-beaked, toothed, or blunt; lower lip erect or ascending, 3-lobed, the lobes mostly spreading. Stamens 4, didynamous, ascending under the upper lip; anther approximate in pairs; anther-sacs transverse, parallel. Capsule compressed, curved, beaked, loculicidal. Seeds many, pitted, striate, or ribbed.

Galea produced into a distinct beak.

Beak long, strongly incurved; lip very broad, meeting or enclosing the tip of the beak.

Leaves undivided, minutely doubly crenate

1 *P. racemosa*

Leaves pinnately divided into linear dentate divisions

Corolla-tube not exerted; beak more or less spirally incurved, calyx deeply cleft in front

Corolla white, calyx greenish-striate and glabrous.

2 *P. contorta*

Corolla purplish or rose, calyx purple-striate and villous at the base.

3 *P. ctenophora*

Corolla-tube distinctly exerted; beak crescent-shaped, arcuate, calyx not deeply cleft in front

4 *P. lunata*

Beak short and straight, lip narrower and not meeting the tip of the galea

Beak about as long as the width of the galea, lip reflexed; primary divisions of the leaves short (8 mm. or less long), not narrowed at the base

5 *P. Parryi*

Corolla yellow or ochroleucous

6 *P. Hallii*

Corolla purple

Beak much shorter than the width of the galea; lip ascending; lower primary divisions of the leaves 8-30 mm. long, usually narrowed at the base

Plant 1-2 dm. high, bracts ovate, all shorter than the flowers

7 *P. Canbyi*

Plant 3-6 dm. high; bracts linear, oblong, or lanceolate, the lower equalling or exceeding the flowers.

8 *P. multifida*

Galea not produced into a distinct beak, but often with two lateral teeth near the apex

Leaves pinnately divided or lobed

Leaves divided to the midrib or nearly so into narrow, acute, dentate or serrate or incised divisions

Galea distinctly arcuate; stems 2-15 dm. high (except in *P. scopulorum*, which often is only 1-2 dm. high).

Galea toothless, plant 4-10 dm. high; lip not reaching the tip of the galea

Corolla pale yellow, spike elongate, 6-30 cm. long, bracts lanceolate, usually produced and exceeding the flowers

9 *P. bracteosa*

Corolla tinged with purple, spike 3-10 cm. long; bracts ovate, short-acuminate and about half as long as the flowers

10 *P. montanensis*

Galea with two lateral teeth

Plant tall, 3-15 dm. high; corolla sordid yellow, 3-3.5 cm. long; lip almost reaching the tip of the galea

11 *P. Grayi*

Plant lower, 1-4 dm. high, corolla purple, 2-2.5 cm. long, lip not reaching the tip of the galea

Leaves divided to the midrib, *i. e.*, rachis not winged, divisions incised

12 *P. cuspideridifolia*

Leaves not quite divided to the midrib, *i. e.*, rachis winged, divisions merely dentate

13 *P. scopulorum*

Galea scarcely arcuate, nearly straight, except the hood-like rounded apex, usually, toothless, plant less than 1 dm. high

Spike very dense, densely lanate, lower lip almost equalling the galea.

14 *P. lanata*

Spike laxer, sparingly if at all lanate, lower lip of the corolla much shorter than the upper

Corolla 18-22 mm. long; lower lip 5 mm. long; galea merely tinged with purple

15 *P. Oederi*

Corolla about 12 mm. long; lower lip of the corolla about 3 mm. long; upper portion of the galea dark purple or crimson.

16 *R. flammula*

Leaves pinnately lobed two-thirds to the midrib or less, with broadly oblong or rounded, obtuse and crenate lobes.

Plants caulescent; stamens merely acute

Stem 1-3 dm. high, lower lip of the corolla much shorter than the upper.

Stem 3-10 dm. high, lower lip of the corolla reaching almost to the tip of the galea.

Plants almost acaulescent; stamens aristate-acuminate at the base.

Leaves merely crenate.

17. *P. canadensis*.

18. *P. lanceolata*.

19. *P. centranthera*

20. *P. crenulata*.

1. ***P. racemosa*** Dougl. Stems cespitose, 3-5 dm. high, glabrous; leaves lanceolate or linear, doubly crenate, 3-8 cm. long; spike leafy-bracted; calyx 5-6 mm. long, very oblique; lateral calyx-lobes lanceolate to triangular, the lower rounded, the upper obsolete; corolla white, 12-15 mm. long; lip broadly reniform, 6-7 mm. long, about 12 mm. wide. Mountain sides: B.C.—Calif.—N.M.—Alta. *Submont.*—*Subalp.* Je—Au.

2. ***P. contorta*** Benth. Stems 2-4 dm. high, glabrous; leaves glabrous, the lower 8-15 cm. long; divisions linear, dentate; raceme 1-2 dm. long; bracts pectinately divided into linear divisions; calyx about 7 mm. long; lobes linear, the lower and lateral ones subequal, the upper much smaller; corolla strongly curved; lip reniform, about 8 mm. long and 12 mm. broad. Mountains: B.C.—Calif.—Ida.—Alta. *Submont.*—*Mont.* Je—Au.

3. ***P. ctenophora*** Rydb. Resembling the preceding species; stem about 3 dm. high, glabrous or slightly arachnoid-hairy in the inflorescence; bracts broader than in the preceding, more or less arachnoid. Mountains: Mont—Wyo. *Mont.* Je—Au.

4. ***P. lunata*** Rydb. Stem about 4 dm. high, slightly striate and purplish; leaves alternate, glabrous, dark green, 5-12 cm. long; segments linear or linear-oblong, crenate; spike 15-20 cm. long; bracts pectinately divided, with prolonged endlobes, slightly arachnoid-villous; calyx about 9 mm. long, its teeth broadly lanceolate, about 3 mm. long; corolla pinkish, over 2 cm. long; lower lip very broad, indistinctly 3-lobed with large rounded lateral lobes. Mountains: Wyo.—Ida. *Mont.* Au.

5. ***P. Parryi*** A. Gray. Stem 1-4 dm. high, glabrous; leaves glabrous, 5-12 cm. long, pinnately divided to near the midrib, divisions lanceolate, 3-6 mm. long, crenate; stem-leaves usually much reduced; raceme 3-13 cm. long; bracts shorter than the flowers, divided into lance-linear divisions; calyx about 7 mm. long, usually glabrous; corolla 12-15 mm. long; galea about 8 mm. long; beak subconic at right angles to the galea; lip rather deeply 3-lobed, 4 mm. long. Mountains: Wyo.—N.M.—Utah—Mont. *Mont.*—*Subalp.* Jl—Au.

6. ***P. Hallii*** Rydb. Stem glabrous up to the inflorescence, 1-2 dm. high; leaves 5-8 cm. long, mostly basal, deeply pinnately divided to near the midrib into lance-oblong crenate divisions 4-5 mm. long; bracts deeply dissected into linear divisions; calyx more or less arachnoid-villous, 7-9 mm. long; lobes lanceolate; corolla purple, resembling that of the next preceding species, but the beak slightly shorter. Mountains: n Wyo. *Subalp.* Je—Au.

7. ***P. Canbyi*** A. Gray. Stem usually less than 1.5 dm. high, but leafy, glabrous; leaves pinnately divided to the midrib, 3-6 cm. long; divisions lanceolate, usually more or less doubly serrate, 5-15 mm. long; spike short and dense; bracts ovate, slightly villous; calyx 8 mm. long, villous, its lobes lanceolate; corolla 15-18 mm. long, light yellow; galea about 8 mm. long, helmet-shaped, with a short usually slightly porrect beak; lip about 4 mm. long, with rounded lobes. Mountains: n Mont. *Subalp.* Jl.

8. ***P. stiffolia*** Rydb. Stem glabrous, 3-6 dm. high, leafy; leaves pinnately divided to the midrib, glabrous, 5-15 cm. long; divisions lanceolate, 1-4 cm. long, more or less doubly serrate-dentate; spike short, 3-8 cm. long; calyx glabrous, 8-9 mm. long, its lobes lanceolate; corolla yellowish, nearly 2 cm. long; galea about 8 mm. long, curved, helmet-shaped, with a short conical beak; lip 4 mm. long, rather deeply 3-cleft, with rounded lobes. Meadows: Ida.—Mont. *Mont.*

9. ***P. bracteosa*** Benth. Stem 3-10 dm. high, glabrous; leaves glabrous, 6-30 cm. long; divisions lanceolate, 2-6 cm. long, laciniately double-serrate; spike elongate, 6-30 cm. long; calyx 8-10 mm. long, villous, its lobes lanceolate; corolla

yellowish, about 2 cm. long; galea 11–12 mm. long; lip erect, 5 mm. long, with rounded crenulate teeth. In lowland, among bushes: B.C.—Calif.—Utah—Colo.—Alta. *Submont*—*Subalp.* Je—Au.

10. *P. montanensis* Rydb. Stem 3–6 dm. high, glabrous; leaves similar to those of the preceding, glabrous; calyx about 8 mm. long, its lobes subulate; corolla 15–18 mm. long, purplish, except a yellow spot on the lip; galea 8 mm. long; lip 4 mm. long, 3-lobed. Mountains: B.C.—Wash.—Wyo.—Alta. *Submont.*—*Mont.* Je—Au.

11. *P. Grayi* A. Nels. Stem 5–20 dm. high, glabrous or pubescent above; leaves 2–6 dm. long, somewhat pubescent, especially when young; divisions lanceolate, often 5–7 cm. long, with triangular dentate lobes; spike 2–4 dm. long; bracts lance-linear, about equalling the flowers; calyx about 1 cm. long, villous-puberulent, its lobes lance-linear; corolla nearly 3 cm. long; galea 12–15 mm. long, cucullate; lip 1 cm. long with broad rounded lobes. *P. procera* A. Gray, not Adams. Mountain woods: N.M.—Wyo.—e Utah. *Mont*—*Subalp.* Jl—Au.

12. *P. cystopteridifolia* Rydb. Stem 2–4 dm. high, purple-tinged; leaves 5–15 cm. long, glabrous; divisions lanceolate, about 1 cm. long, incised and serrate; bracts lanceolate, long-acuminate; calyx densely villous, nearly 1 cm. long, its lobes lanceolate; corolla over 2 cm. long, dark reddish purple; galea nearly 1 cm. long, arcuate, cucullate; lip about 7 mm long, with rounded lobes. *P. elata* Pursh, not Willd. *P. cystopterides* Clements. Mountains: Mont.—Wyo. *Mont.*—*Subalp.* Jl—Au.

13. *P. scopulorum* A. Gray. Stem 1–2 dm. high, glabrous or villous above; leaves 4–8 cm. long, divisions lanceolate 3–5 mm. long, dentate; spike short, 3–5 cm. long; bracts lanceolate, arachnoid-villous, calyx 8 mm. long, arachnoid-villous, its lobes subulate-triangular; corolla purple, 15–18 mm. long; galea over 1 cm. long, arcuate and cucullate at the apex. Mountains: Colo. *Subalp.*—*Alp.* Jl.

14. *P. lanata* Willd. Stem densely lanate; leaves 2–3 cm. long, glabrous, blackening in drying; divisions oblong, crenate, 1–2 mm. long; spike dense, 3–5 cm. long; calyx about 7 mm. long; lobes oblong; corolla reddish purple or rose-colored, about 2 cm. long; galea about 7 mm. long; lip almost as long, deeply 3-lobed, with rounded lobes. Arctic-alpine situations: Greenl.—Lab.—Canadian Rockies—Alaska; Eurasia. *Alp.* Je—Jl.

15. *P. Oederi* Vahl. Stem 1–1.5 dm. high, glabrous; leaves glabrous, 3–6 cm long; divisions broadly oblong to oval, dentate, 3–5 mm. long; spike more lax, 3–10 cm. long; calyx 8–12 mm. long, slightly more deeply cleft in front; lobes lanceolate; corolla 18–22 mm long, yellowish, with purple-tinged galea, which is about 8 mm. long; lip deeply 3-cleft, with rounded lobes. *P. versicolor* Vahl. Arctic-alpine situations: Alaska—Mont; Eurasia. *Alp.* Jl—Au.

16. *P. flammea* L. Stem glabrous, 3–10 cm. high; leaves darkening in drying, 2–6 cm. long; divisions oblong or oval, crenate, 3–5 mm long; spike 2–5 cm. long, with almost erect flowers; calyx about 8 mm. long; lobes lanceolate; corolla about 15 mm. long, citron-yellow, with dark purple or crimson galea, which is about 6 mm. long. Arctic-alpine situations: Greenl.—Lab.—Canadian Rockies—Alaska; Eu. *Alp.* Je—Au.

17. *P. canadensis* L. Stems 1.5–4.5 dm. high, more or less pubescent, or glabrate below; leaves 7–13 cm. long, more or less pubescent; lobes oblong, obtuse, incised and dentate; spike 1–2 dm. high; the lower bracts foliaceous; calyx oblique, deeply cleft on the lower side; lobes minute, triangular; corolla yellow or reddish, 2–2.5 cm. long; galea nearly 1.5 cm. long, arcuate, beakless, but with 2 teeth near the apex; lip about 8 mm. long, 3-lobed. Woods and thickets: N.S.—Fla.—N.M.—Colo.—Man; Mex. *Submont*—*Mont.* My—Jl.

18. *P. lanceolata* Michx. Stem glabrous or nearly so, 3–10 dm. high; leaves often opposite, lanceolate, 5–13 cm. long; lobes oblong or ovate, obtuse, crenate-dentate; spikes 5–10 cm. long; calyx about 1 cm. long, cleft above and below, the two lobes somewhat foliaceous and crenate; corolla 2–2.5 cm. long, yellow, sometimes ringed with rose; galea 12–14 mm. long, arcuate, truncate at the

apex; lower lip 10-12 mm. long; lobes rounded. In swamps: Ont.—Conn.—Va.—Neb.—Sask. *Plain.* JI-O.

19. *P. contranthera* A. Gray. Stem short, glabrous, with the spike 1.5 dm. or less; leaves 5-15 cm. long, glabrous, divisions oval or ovate, doubly dentate, about 1 cm. long, with callous mucronate teeth; bracts linear or nearly so, ciliate and often toothed towards the apex; calyx about 2 cm. long, its lobes linear to linear-lanceolate; corolla 3-3.5 cm. long, purple or yellowish; galea slightly curved, about 1 cm. long; lip about 8 mm. long with short rounded crenate lobes. Mountains: N.M.—Colo.—Utah—Calif. *Submont.* Ap-Je.

20. *P. crenulata* Benth. Stem more or less villous-puberulent, 2-4 dm. high; leaves linear, obtuse, 3-7 cm. long, doubly crenate; spike 3-10 cm. long; bracts similar to the leaves; calyx cleft in front, 2-3-lobed; lobes ovate-lanceolate; corolla 2-2.5 cm. long, purplish or white; galea about 1 cm. long, curved, not beaked, but with two small triangular teeth; lip 7-8 mm. long, rather deeply 3-lobed; lobes rounded. Mountains: Wyo.—Colo.—Nev. *Submont.*—*Mont.* Je-Au.

26. RHINANTHUS L. RATTLE-BOX, YELLOW RATTLE.

Annual, erect, caulescent herbs, blackening in drying. Leaves opposite, toothed or lobed. Flowers perfect, in terminal, leafy, one-sided spikes or solitary in the upper leaf-axils. Calyx compressed, 4-toothed, much inflated in age and reticulate. Corolla irregular, 2-lipped; upper lip compressed, arched, minutely 2-toothed below the apex; lower lip shorter, with 3 spreading lobes. Stamens 4, didynamous, ascending under the upper lip; anthers pilose; sacs transverse. Capsule orbicular, flat, loculicidal. Seeds several, orbicular, winged. Corolla-tube exerted, teeth of the upper corolla-lip triangular, 1 mm. long.

Corolla-tube included; teeth of the upper lip rounded.

1. *R. Kyrollae* Chab. Stem 3-7 dm. high, usually without black lines, glabrous, or pilose at the nodes and in decurrent lines, often branched at flowering time, yellowish; leaves elongate, lanceolate, oblong, or linear, dentate, with acute teeth, scabrous, calyx short-hairy, ciliate on the margins, corolla 8-9 mm. long, tube yellow. *R. Crusta-Galli* Rydb. (Fl. Colo.) Thickets and meadows: N.S.—Md—Colo.—Wash.—Alta. *Submont.* JI-Au.

2. *R. rigidus* Chab. Stem 2-6 dm. high, rigid, pilose in decurrent lines, at first simple, later branched, with strongly ascending branches; leaves glabrous or scabrous above and puberulent beneath, lanceolate or linear-lanceolate, dentate and hispidulous-ciliate on the margins; calyx glabrous or puberulent; corolla 7-8 mm. long. Meadows: Alta.—Colo.—Wash.—Alaska. *Submont.*—*Mont.* Je-Au.

27. MELAMPYRUM (Tourn.) L. COW-WHEAT.

Annual herbs, often blackening in drying. Leaves opposite, entire or few-toothed. Flowers perfect, solitary in the upper leaf-axils, or in leafy-bracted spikes. Calyx 4-toothed, the upper 2 teeth somewhat longer. Corolla irregular, 2-lipped; tube gradually enlarged upwards; upper lip compressed, obtuse or retuse; lower lip 3-lobed, 2-grooved beneath. Stamens 4, didynamous, ascending under the upper lip. Anther-sacs parallel. Capsule flat, oblique, loculicidal. Seeds 2-4, smooth, strophiolate.

1. *M. lineare* Lam. Stem 1-5 dm. high, 4-angled, with puberulent lines; leaves lanceolate or linear-lanceolate, acuminate, short-petioled, 2-7 cm. long, entire; bracts broader, often ovate-hastate, or with salient bristle-pointed teeth; calyx-teeth subulate; corolla 8-12 mm. long, white or whitish, turning purplish. Dry woods: N.S.—N.C.—Ida.—B.C. *Mont.* My-Au.

Family 118. **LENTIBULARIACEAE. BLADDERWORT FAMILY.**

Small scapose or caulescent herbs, growing in water or wet places. Leaves when submerged dissected into linear or filiform segments, often bladder-bearing, or when aerial basal and entire, or rarely wanting. Scapes naked

the tube of the corolla; anthers 2-celled, versatile, opening lengthwise. Fruit a circumscissile capsule; seeds one to several in each cell, amphitropous; endosperm fleshy.

1. **PLANTAGO** (Tourn.) L. PLANTAIN, RIBGRASS.

Annual or perennial herbs, in ours acaulescent and with basal leaves only. Blades often broad, prominently ribbed. Flowers spicate, in an elongate spike, sometimes conspicuously bracted. Calyx-lobes equal, or 2 longer. Corolla mostly salver-shaped, constricted at the throat. Capsule more or less membranous. Seeds with flattened or concave faces.

Flowers all perfect; corolla not closed over the fruit; stamens 4

Leaves lanceolate to ovate, neither leaves nor spike silky pubescent or lanate, stamens in all the flowers long-exserted

Spike cylindrical, seeds not concave on the faces

Leaves ovate, abruptly contracted at the base; seeds more than 2 in each cell.

Pyxis dehiscent at the middle, round-ovoid, obtusish, leaves usually thick and the dense spike obtuse

Pyxis dehiscent far below the middle, elongate-ovoid, very acute; leaves thin and the lax spike acute

Leaves lanceolate, gradually tapering into the petioles, seeds not more than 2 in each cell

Leaves thin, plant not woolly at the base.

Leaves thick

Plant sparingly pubescent, with red or brown wool at the base

Plant copiously villous with jointed hairs, not woolly at the base

Spike short, oblong, 1-3 cm. long, seeds concave on the faces; leaves narrowly lanceolate

Leaves linear; leaves or peduncles or both more or less pubescent with long silky hairs, anther in the more fertile flowers included, seeds solitary in each cell, concave on the faces

Bracts aristate or herbaceous, at least the lower ones 2-many times as long as the flowers

Bracts all much exceeding the flowers

Plant dark green, spike compact

Plant light green, spike more slender

Upper bracts scarcely exceeding the flowers

Bracts neither aristate nor foliaceous, slightly if at all exceeding the flowers

Bracts linear-subulate, spike long-cylindric

Bracts ovate, obtuse, spike globose to oblong

Flowers subdioecious or polygamo-dioecious; corolla in the fertile plant remaining closed or early closing over the capsule, stamens 2, leaves filiform

1. **P. major** L. Perennial; leaves petioled; blades oval or ovate, sparingly pubescent or glabrous, 5-35 cm. long, 5-7-ribbed, entire or coarsely toothed; scape 8-15 cm. long; spike dense, 4-20 cm. long; sepals ovate, acute, not keeled; corolla-lobes spreading or reflexed; pyxis ovoid, 3 mm. long; seeds 6-18. Waste places. Ncwf.—B.C.—Calif.—Fla.; nat. from Eu. *Plain—Mont.* My-S.

2. **P. asiatica** L. Perennial; leaves petioled; blades oval or ovate, sparingly pubescent or glabrate, thin, 1-2 dm. long, 5-7-ribbed, dentate or subentire; scape 1-2.5 dm. high; spike laxer than in the preceding; bracts ovate, scarious-margined, round-keeled; sepals suborbicular, scarious, with green midrib, not keeled; corolla-lobes spreading; pyxis ovate, 3-4 mm. long; seeds 14-20. *P. nutrophila* A. Nels. Alkaline ground and waste places: Sask.—Neb.—Colo.—B.C. *Plain—Submont.* My-S.

3. **P. Tweedyi** A. Gray. Perennial; leaves short-petioled; blades narrowly lanceolate or oblanceolate, glabrous, 3-5-ribbed, thin, 3-7 cm. long; scape 1-2 dm. high; spike 2-5 cm. long, dense; bracts and sepals broadly oval, with green midrib, 2 mm. long; pyxis ovoid, acute, 4 mm. long, circumscissile near the base. Grassy slopes: Mont.—N.M.—Utah. *Submont.—Subalp.* Je-Au.

4. **P. eriopoda** Torr. Perennial; leaves petioled; blades oblanceolate, lance-oblong or elliptic, entire, 3-9-ribbed, pubescent, 0.5-2 dm. long; scape 1.5-4 dm. high; spike 2-10 cm. long, dense above; sepals oblong-obovate, scarious-margined; pyxis ovoid-oblong, obtuse, circumscissile below the middle. *P. retrorsa* Greene. Alkaline or saline soil: N.S.—Que.—Minn.—N.M.—Nev.—Alta. *Plain—Submont.* Je-S.

5. *P. septata* Morris. Perennial; leaves short-petioled; blades narrowly lanceolate, entire, about 1.5 dm. long, 1.5 cm. wide, 5-ribbed, woolly; scape about 15 cm. high, woolly, especially below; spike about 5 cm. long, in fruit rather loose; bracts and sepals rounded-ovate, scarious-margined, obtuse, 2 mm. long, glabrous; pyxis finely reticulate, circumscissile one-third from the base, oblong, rounded at the apex. Plains and gulches: Alaska—Mont.—Mack. *Plain*—*Subarctic*. Je—Au.

6. *P. lanceolata* L. A biennial or perennial; leaves 4–30 cm. long, linear-elliptic to elliptic, acute, 3–7-ribbed, entire or denticulate, hairy at the base; scapes 1–7 dm. long; spike dense, 1–8 cm. long; calyx-lobes 2–3 mm. long, broadly oblong, obtuse; capsule oblong, circumscissile at the middle, 2-seeded. Lawns and waste places: N.B.—Alaska—Colo.—Fla.; nat. from Eu. *Plain*. Ap—N.

7. *P. aristata* Michx. Annual; leaves linear, acuminate, pubescent, 3-ribbed, 1–5 mm. wide; scape stout, erect, 7–30 cm. long; spike 3–12 cm. long, pubescent; bracts 1–3 cm. long; sepals spatulate-oblong, obtuse; corolla-lobes ovate, spreading; pyxis 2.5–3 mm. long, circumscissile at the middle; seeds 2. Dry soil: Me.—B.C.—N.M.—Fla. *Plain*. My—O.

8. *P. spinulosa* Decne. Annual; leaves linear, acuminate, 3-ribbed, 3–6 mm. wide, villous; scape 5–10 cm. long; spike interrupted, 3–7 cm. long, villous; bracts 7–15 mm. long, spreading; sepals spatulate-oblong, obtuse; corolla-lobes ovate, spreading; capsule 2.5 mm. long, obtuse, circumscissile at the middle, 2-seeded. Sask.—Alta.—Tex. *Plain*. My—O.

9. *P. xerodea* Morris. Annual; leaves linear, 3–20 cm. long, 2–4 mm. wide, glabrate or villous; scape 1–20 cm. high, pubescent; spike 1–6.5 cm. long; bracts herbaceous, linear, attenuate, the lower three times as long as, the upper merely equalling the flowers, scarious-margined at the base; sepals oblong, scarious, with green rib; pyxis round-ovate, circumscissile just below the middle. *P. picta* Morris. Arid regions: Ariz.—s Utah—s Calif. *L. Son.*

10. *P. Purshii* R. & S. Annual; leaves ascending, linear, or nearly so, acute, short-petioled, 3-ribbed, 3–8 cm. long, entire, woolly; scape 5–35 cm. long; spike dense, cylindric, 2–12 cm. long, very villous; sepals oblong, obtuse, scarious-margined; corolla-lobes ovate, spreading; pod oblong, circumscissile about the middle, 2-seeded. *P. graphalioides* Nutt. Plains and river valleys, in sandy soil: Ont.—Sask.—B.C.—Ariz.—Tex.—Mo. *Plain*—*Mont.* My—Au.

11. *P. scariosa* Morris. Annual; leaves linear or lance-linear, 2–4 cm. long, 2–4 mm. wide, obscurely 3-ribbed, white-villous; scape 3–12 cm. long, villous; spike 6–20-flowered, globose to oblong, 5–18 mm. long, densely villous; bracts scarious, with green rib, ovate, obtuse; sepals similar, with green or purple rib; pyxis twice as long as the sepals, circumscissile just below the middle. Arid places: Calif.—Utah—Ariz. *Son.*

12. *P. elongata* Pursh. Annual; leaves cinereous-pubescent, linear, entire or nearly so, 1-ribbed, 3–10 cm. long, 0.5–2 mm. wide; scape 3–8 cm. high; spike 1–10 cm. long; bracts triangular-ovate, scarious-margined, 2 mm. long; corolla-lobes triangular, 0.5 mm. long; pyxis oblong-ovate, rounded at the apex, circumscissile just below the middle. *P. myosuroides* Rydb. Wet places: Sask.—Okla.—Utah.—Alta.

FAMILY 122. RUBIACEAE. MADDER FAMILY.

Herbaceous or woody plants, with opposite or apparently verticillate leaves and usually perfect, but often dimorphous or trimorphous, regular and symmetrical flowers. Ovary inferior, sunken into and adnate to the hypanthium. Corolla in ours funnelform or rotate, gamopetalous and 3–5-lobed. Stamens as many as the lobes of the corolla and alternate with them; filaments adnate to the corolla; anthers mostly linear-oblong. Ovary in ours 2-celled, ripening into a didymous indehiscent, dry or fleshy fruit. Ovules solitary in each cell. Endosperm in our genera fleshy or horny.

Leaves opposite; corolla funnellform.
 Leaves apparently verticillate, corolla rotate
 Flowers 3-4-merous, usually white, fruit dry.
 Flowers 5-merous, yellow, fruit baccate.

- 1 KELLOGGIA.
 2. GALIUM.
 3. RUBIA.

1. KELLOGGIA Torr.

Perennials, with opposite leaves, small interposed stipules and small white or pinkish flowers in panicle cymes. Flowers perfect, 3-5- (mostly 4-) merous. Hypanthium obovoid. Calyx-teeth minute, persistent. Corolla funnel-salverform; lobes valvate in the bud. Stamens adnate to the corolla up to the throat, exerted; filaments flat; anthers fixed above the base. Ovary 2-celled; style filiform, exerted; stigmas 2, linear-clavate. Ovules solitary, erect, anatropous. Fruit dry, coriaceous, beset with uncinate bristles, separating into 2 carpels. Albumen fleshy.

1. *K. galioides* Torr. Stem slender, glabrous or puberulent, 1-3 dm. high; leaves narrowly lanceolate, 1.5-5 cm. long, sessile, 1-3-nerved, acute at the apex; corolla 5-7 mm. long and as wide; fruit 3-4 mm. long and, with the bristles, 3-4 mm. in diameter. Mountain woods: Wyo.—Wash.—Ariz.—Calif. *Submont.*—*Mont.* Je-Jl.

2. GALIUM L. BEDSTRAW, CLEAVERS.

Annual or perennial herbs, some somewhat woody at the base, with 4-angled stems and branches, apparently verticillate leaves* and small, mostly white flowers in cymes or panicles. Flowers perfect or in some species dioecious. Hypanthium globose or ovoid. Calyx obsolete. Corolla wheel-shaped, 4-parted, or rarely 3-parted. Stamens 4, rarely 3; filaments short. Styles 2; stigmas capitate; ovary 2-celled, with one ovule in each cell. Fruit didymous, of two indehiscent carpels, often bristle-hairy, dry.

Flowers perfect; fruit hirsute with uncinuate hairs, or glabrous.

Annuals

Stem coarse, reclining; leaves 6-8 in the whorls

Leaves linear or oblanceolate

Leaves 2-7 cm long; nutlets when ripe 3-5 mm in diameter; flowers white.

Leaves 0.5-2 cm. long; nutlet when ripe 2-3 mm in diameter; flowers

ochroleucous

Leaves elliptic

Stem slender, erect or ascending, leaves 2-4 in the whorls.

Leaves ovate or oblong, 5-7 mm long, fruit nearly sessile.

Leaves linear-oblong or linear, often 10-20 mm long, fruit distinctly peduncled.

Perennials

Leaves not cuspidate-pointed.

Stem stout, leaves thick, 3-nerved.

Stem very slender, leaves 1-nerved.

Leaves mostly 4 in the whorls, 5-15 mm. long.

Leaves obovate to broadly oblong-lanceolate, somewhat fleshy.

Corolla-lobes almost 1 mm. long; pedicels and generally also the

stem glabrous

Corolla-lobes about 0.5 mm long; pedicels and stem more or less

scabrous.

Leaves linear-oblong or linear-oblancoolate.

Leaves of the stem mostly 5-6 in the whorls, 15-30 mm long.

Leaves cuspidate-pointed.

Fruit uncinate long-hispid; stem glabrous or sparingly hirsute or bristly;

inflorescence axillary, mostly simple.

Stem retrorse-bristly; pedicels scarcely exceeding the bracts.

Stem glabrous or sparingly hirsute; pedicels much exceeding the small

bracts

Fruit minutely hispidulous or granular-scabrous; stem scabrous on the angles;

inflorescence paniced.

Leaves firm, with strong midrib, lanceolate or oblanceolate; pedicels in

fruit somewhat spreading.

Leaves thin, oblong, rounded and mucronate at the apex; pedicels very

fine, in fruit spreading at right angles.

13. *G. filipes*.

* The leaves are really opposite, but the interposed stipules are large and leaf-like.

- Flowers dioecious, in small cymes; fruit with long, not uncinat hairs; perennials
 Leaves linear. 14. *G. coloradense*.
 Leaves ovate or lanceolate.
 Plant glabrous or nearly so
 Leaves of the stem lanceolate to ovate, 8-15 mm. long. 15. *G. Watsoni*
 Leaves broadly ovate, 5-8 mm. long. 16. *G. Bloomeri*
 Plant decidedly puberulent
 Plant pruinose-puberulent, leaves broadly ovate, not cuspidate 17. *G. multiflorum*.
 Plant hispidulous-puberulent; leaves lanceolate, cuspidate. 18. *G. stellatum*.

1. *G. Aparine* L. Stem weak, prostrate or scrambling over bushes, 3-15 dm. long, retrorsely hispid on the angles; leaves 6-8 in the whorls, oblanceolate, sometimes almost linear, 2-7 cm. long, 4-10 mm. wide, cuspidate, the margins and midribs retrorsely hispid; flowers white in 1-3-flowered cymes in the upper axils. Copses: N.B.—Fla.—Mo.—Tex.—Calif.—B.C.; nat. from Eu. *Plain—Submont.* My-S.

2. *G. Vaillantii* DC. Stem prostrate, retrorsely hispid as the preceding, but the internodes shorter, and the whole plant smaller; leaves 6-8 in the whorls, usually oblong-linear, sometimes slightly oblanceolate, cuspidate-pointed; flowers in 2-9-flowered cymes. Low ground among bushes: Ont.—Fla.—Tex.—Calif.—B.C.; Eurasia. *Plain—Submont.* My-Au.

3. *G. proliferum* A. Gray. Stem hispidulous, branching, 3 dm. high; leaves 5-8 mm. long, acute, with a strong midrib, mostly 4 in the whorls, the alternate ones often smaller; flowers solitary on axillary peduncles which are about twice as long as the leaves, almost sessile in the axil of two leaf-like bracts; peduncles sometimes with one or two proliferations from the axils of the bracts; carpels about 2 mm. in diameter. On stony hills: Tex.—s Utah—Ariz.; Mex. *L. Son.* Ap-Je.

4. *G. bifolium* S. Wats. Stem slender, erect, glabrous, 1-1.5 dm. high; leaves 2-4 in the whorls, often very unequal, thin, acutish, 1-nerved; flowers solitary on axillary peduncles, horizontal and curved under the fruit; carpels about 2 mm. in diameter. In mountain meadows and around springs. B.C.—Mont.—Colo.—Calif. *Submont.* My-Jl.

5. *G. boreale* L. Stem erect, glabrous, 2-7 dm. high; leaves 4 in the whorls, from linear to broadly lanceolate, obtuse or acutish, 3-5 cm. long, the margins sometimes ciliate and slightly revolute, often with fascicles of smaller leaves in the axils; flowers white or ochroleucous (var. *linearifolium*) in terminal, densely many-flowered compound cymes; carpels about 2 mm. in diameter. Rocky places, hillsides, and along streams: Que.—N J.—Neb.—N.M.—Calif.—Alaska; Eurasia. *Plain—Mont.* My-Au.

6. *G. Brandegei* A. Gray. Stem loosely branched, glabrous, slender, 5-15 cm. high, generally depressed; leaves unequal, 4-12 mm. long, somewhat fleshy, obtuse; midrib faint; flowers usually solitary or geminate, on axillary peduncles, corolla white; fruit glabrous, its carpels about 1.5 mm. in diameter. Around springs: Wyo.—N M.—Ariz.—Calif. *Submont.—Mont.* Je-Au.

7. *G. subbiflorum* (Wiegand) Rydb. Stem slender, prostrate, 1-3 dm. long, somewhat scabrous on the angles; leaves mostly obtuse, slightly fleshy and with a faint midrib, 5-15 mm. long; peduncles axillary, usually solitary, or more rarely geminate, 1-flowered, or less commonly 2-3-flowered; corolla white, 3-lobed; fruit glabrous, its carpels 1-1.5 mm. in diameter. *G. trifidum subbiflorum* Wiegand. Wet places: Minn.—N.M.—s Calif.—Wash. *Plain—Mont.* Je-Au.

8. *G. trifidum* L. Stem slender, ascending or depressed, 2-4 dm. long, branched, scabrous on the angles; leaves 5-15 mm. long, obtuse, 1-nerved, thin, dark green and dull on both sides; midrib and margins scabrous; flowers on slender 1-3-flowered axillary peduncles; corolla white, 3-lobed, its lobes about 0.5 mm. long; fruit glabrous, its carpels about 1.5 mm. in diameter. Wet meadows and swamps: Lab.—Newf.—N.Y.—Colo.—Alaska. *Plain—Submont.* Je-Au.

9. *G. columbianum* Rydb. Stem slender, 3-10 dm. long, branched, somewhat scabrous on the angles; leaves of the stem generally linear-oblong or

oblanceolate, obtuse, 1-nerved, scabrous on the midrib and margins; leaves of the branches generally 4 in the whorls, smaller; flowers axillary or in small terminal cymes, white; peduncles slender, 5-20 mm long, solitary or geminate, 1-3-flowered, often curved; corolla white, 3-lobed; fruit glabrous; carpels about 1.5 mm. in diameter. Damp woods and on grassy banks: Mont.—Wash.—Alaska. *Submont.* Je—Au.

10. *G. flaviflorum* Heller. Stem diffuse, 3-10 dm. long; leaves mostly 6 in the whorls, elliptic or lance-oblong, retrorsely hispidulous on the midrib and margins, 2-5 cm. long; peduncles axillary, 2-4-flowered, about equalling the leaves; bracts lanceolate; corolla pale greenish yellow, 4-lobed; fruit hispid with uncinete hairs, carpels 2-3 mm. in diameter. Hills: N.M.—s Colo. *Submont.* —Mont. Jl—Au.

11. *G. triflorum* Michx. Stem diffuse, 3-10 dm. long, glabrous or very sparingly hirsute, shining; leaves mostly 6 in the whorls, narrowly oval or slightly oblanceolate, 1-ribbed, narrowed at both ends, 3-7 cm. long; peduncles axillary or terminal, often exceeding the leaves, mostly 3-flowered; corolla greenish white, 4-lobed; fruit long-hispid with uncinete hairs; carpels 3-4 mm. in diameter. Damp open woods: Newf.—Ala.—Colo.—Calif.—Alaska. *Plain—Mont.* Je—Au.

12. *G. asperulum* (A. Gray) Rydb. Stem erect or ascending, but weak, 3-6 dm long, retrorse-hispidulous on the angles, leaves thin, 2-4 cm. long, linear-oblanceolate, 1-ribbed, cuspidate at the apex, hispidulous on the ribs and margins, flowers in axillary and terminal, more or less compound cymes; branches merely ascending-spreading in fruit, 1-1.5 cm. long; corolla purplish, its lobes acute; fruit very short uncinete-hispid or granular-scabrous; carpels 1-1.5 mm. in diameter. *G. asperrimum asperulum* A. Gray. In copses and rocky places: Wash.—Ida.—Utah—Calif. *Submont.*

13. *G. filipes* Rydb. Stem ascending, about 5 dm. long, minutely, retrorsely hispidulous; leaves broadly oblanceolate, obtuse and cuspidate at the apex, thin, 2-4 cm. long, retrorsely hispidulous on the veins and margins; flowers in axillary or terminal cymes, the latter more compound; pedicels divaricate, very slender, in fruit often 1 cm. long; corolla purplish, 4-lobed; lobes acuminate; fruit minutely hispidulous; carpels 1.5 mm. thick, fully 2 mm. long. Among bushes: Utah—Nev. *Submont.* Jl.

14. *G. coloradense* W. Wight. Stem erect, perfectly glabrous, with upright branches, about 3 dm. high, slightly woody at the base; leaves rather thick and firm, linear, acute, 1-ribbed, 1-2.5 cm. long and 2-3 mm. wide, 4 in the whorls; cymes of the sterile plant 8-15-flowered, those of the fertile plant 1-5-flowered; corolla apparently yellowish, 2 mm. wide; hypanthium of the sterile flowers glabrous; carpels, including the hairs, 3-4 mm. in diameter. Dry regions: sw Colo.—se Utah. *Submont.* Je—Jl.

15. *G. Watsoni* (A. Gray) Heller. Stem branched, with a somewhat woody base, 0.5-4 dm. high, glabrous or nearly so; cymes of the sterile plant 3-9-flowered, those of the fertile plant 1-5-flowered; leaves 4 in the whorls, generally unequal in size, 8-15 mm long, rather firm, more or less distinctly 3-ribbed, acute or acuminate; corolla yellowish, about 3 mm. in diameter; hypanthium of sterile flowers sparingly short-hispid, carpels, with hairs, 5-6 mm. in diameter. On dry mountains: Ida.—Ore.—Ariz. *Submont.* Je—Au.

16. *G. Bloomeri* A. Gray. Stem glabrous, branched, somewhat woody at the base, 1-3 dm. high; leaves 4 in the whorls, firm, 5-8 mm. long, 3-ribbed, acute or more commonly abruptly short-acuminate; cymes of the sterile plant 3-9-flowered, those of the fertile plant 1-5-flowered; corolla yellowish, about 2 mm. in diameter; hypanthium of the sterile flower glabrous or puberulent, or with a few long hairs at the base; carpels, with hairs, 3-4 mm. in diameter. Dry mountains: Utah—Ida.—Nev.—Calif. *Submont.* Je—Au.

17. *G. multiflorum* Kellogg. Stem branched, very similar to the preceding in habit; leaves 4 in the whorls, acute, more or less distinctly 3-ribbed, 5-12 mm. long; cymes of the sterile plant 3-7-flowered, those of the fertile plant 1-3-flowered, with very short pedicels; corolla light yellow, about 3 mm. broad; hypan-

thium of the sterile flowers puberulent or with a few long hairs; carpels, with hairs, 4-7 mm. in diameter. Barren hills and mountains: Utah—Wash.—Calif. *Submont.*

18. *G. stellatum* Kellogg. Stem intricately branched, woody at the base, 1-4 dm. high; leaves 1-ribbed, 4-10 mm. long, very firm; cymes of the sterile plants 3-5-flowered, those of the fertile ones 1-3-flowered, with very short pedicels; corolla white, 1.5 mm. in diameter; hypanthium in both kinds of flowers hairy, but longer so in the fertile ones; carpels in fruit, with hairs, 3-4 mm. in diameter. Arid regions: Utah—Ariz.—Calif.—L. Calif. *Son.*

3. *RUBIA* L. MADDER.

Perennial herbs, often woody below. Leaves apparently verticillate as in *Galium*. Flowers in axillary and terminal cymes. Corolla rotate or campanulate, 5-lobed. Styles 2, connate at the base; stigmas capitate. Fruit didymous or globose, succulent.

1. *R. tinctorum* L. Stem about 1 m. high, armed with small hooked prickles on the angles; leaves lanceolate, retrorse-prickly on the ribs and margins; flowers bright yellow; lobes ovate-lanceolate, acute; berry subglobose, black, the size of a pea. Waste places: Utah; adv. from the Mediterranean region. *Je-Au.*

FAMILY 123. *CAPRIFOLIACEAE*. HONEYSUCKLE FAMILY.

Shrubs, trees, vines, or perennial herbs, with opposite leaves and perfect, regular or irregular flowers, mostly in cymes. Stipules generally none. Calyx 3-5-lobed or 3-5-toothed. Corolla gamopetalous, from rotate to tubular, often gibbous at the base; limb 5-lobed and sometimes 2-lipped. Stamens 5, in *Linnaea* only 4, adnate to the corolla and alternate with its lobes; anthers versatile. Ovary inferior, enclosed in the hypanthium, 1-6-celled. Fruit a 1-6-celled berry, drupe, or capsule. Ovules anatropous. Seed with a fleshy albumen; embryo small.

Style deeply 3-5-cleft, shrubs or trees with compound cymose inflorescence and drupaceous fruit

Leaves pinnate; ovary 3-5-celled, each cell with one ovule	1. <i>SAMBUCUS</i>
Leaves simple, ovary 1-celled and 1-ovuled	2. <i>VIBURNUM</i> .
Style slender, undivided, stigma capitate	
Trailing evergreen herb, flowers long-peduncled, geminate, stamens 4, didynamous.	3. <i>LINNAEA</i> .

Shrubs, stamens generally 5.

Fruit a few-seeded berry

Corolla rarely gibbous at the base, regular or nearly so; fruit 2-seeded

4. *SYMPHORICARPOS*.

Corolla gibbous at the base, mostly irregular and bilabiate, fruit several-seeded.

Flowers in heads at the ends of the branches or in verticils in the upper axils;

upper leaves connate, vines

5. *LONICERA*

Flowers in pairs on axillary peduncles; leaves not connate, erect shrubs.

Bracts and bractlets minute, not foliaceous, berries of the two flowers

more or less united

6. *XYLOSTEON*

Bracts and bractlets foliaceous; berries of the two flowers distinct.

7. *DISTEOLA*

Fruit a 2-celled capsule, corolla slightly gibbous and somewhat irregular.

8. *DIERVILLA*.

1. *SAMBUCUS* (Tourn.) L. ELDER.

Shrubs or trees with opposite, odd-pinnate leaves, large pith in the young branches, small whitish flowers in compound cymes. Hypanthium ovoid or turbinate. Calyx-lobes minute, generally 5. Corolla rotate or saucer-shaped, regular, 5-lobed. Stamens 5, inserted at the base of the corolla; anthers oblong. Style short, 3-5-cleft; ovary and berry-like drupe 3-5-celled, each cell containing 1 ovule or seed.

Cyme not flat-topped, thyrsoid-paniculate, the axis continuous.

Fruit red or rarely yellow.

Young branches, inflorescence and the lower surfaces of the leaves pubescent.

1. *S. pubens.*

- Whole plant glabrous.
 Fruit black
 Cyme flat-topped, umbelliform, 4-5-rayed, the rays again variously compound; fruit blackish
 Fruit without bloom or nearly so, generally less than 5 mm. broad
 Leaflets ovate, ovate-lanceolate, to obovate, dark green
 Leaflets lanceolate, pale green
 Fruit with copious bloom, generally over 5 mm. broad.
2. *S. microbotrys*.
 3. *S. melanocarpa*.
 4. *S. canadensis*
 5. *S. neomexicana*.
 6. *S. coerulea*.

1. *S. pubens* Michx. Shrub, 6-35 dm. high; leaflets 5-7, dark green, ovate-lanceolate or oval, long-acuminate, generally narrowed and slightly oblique at the base, 5-12 cm. long, sharply serrate; cyme about 5-6 cm. high and 4-5 cm. broad; corolla white, turning brownish in drying; drupe scarlet or red or occasionally amber yellow, 4-6 mm in diameter. *S. racemosa* Hook., not L. Damp rocky places: N.S.—Ga.—Colo.—B.C.—Alaska. *Submont.* Ap—My.

2. *S. microbotrys* Rydb. Shrub low, 5-20 dm. high, with pale green foliage; leaflets ovate or rarely ovate-lanceolate, acute or short-acuminate, 3-9 cm. long, mostly rounded and oblique at the base, coarsely serrate; cyme small, about as long as broad, about 3 cm. in diameter; flowers whitish; fruit bright red, 4-5 mm. in diameter. Damp places in mountains: S.D.—Colo.—Ariz.—Utah. *Submont.*—*Subalp.* My—Je.

3. *S. melanocarpa* A. Gray. Shrub 1-2 m high, glabrous, or the young leaves pubescent, with dark green foliage; leaflets 5-7, oval or ovate to ovate-lanceolate, coarsely serrate, abruptly acuminate, often obtuse or rounded and decidedly oblique at the base, 4-15 cm. long; cyme convex, fully as broad as high, 4-7 cm. in diameter; corolla white, but turning somewhat brownish in drying; fruit black, without bloom, 5-6 mm. in diameter. Along streams: Alta.—N.M.—Utah—B.C. My—Je.

4. *S. canadensis* L. A shrub, 1-3 meters high, glabrous or nearly so, with dark green foliage; leaflets 5-11, mostly 7, ovate or oval, sharply serrate, mostly short-acuminate at the apex, acute or obtuse at the base, sometimes pubescent on the veins beneath, 5-12 cm. long, often with linear stipels; cyme flat-topped, 5-15 cm. high and 1-2 dm. broad; flowers white; fruit purplish black, 4-5 mm. in diameter. In wet soil: N.S.—Fla.—Tex.—Colo.—Mont.—Sask. *Plain*—*Submont.* Je—Jl.

5. *S. neomexicana* Wooton. Shrub 2 meters high, almost perfectly glabrous, with pale green foliage; leaflets 5-7, lanceolate, coarsely serrate, long acuminate at the apex, acute and generally very oblique at the base, 4-12 cm. long; cyme 4-8 cm. high and 6-15 cm. broad; flowers white; fruit bluish black, 4-5 mm. in diameter. Wet places in the mountains: N.M.—Colo. *Submont.*—*Mont.*

6. *S. coerulea* Raf. Shrub in clumps, 2-4 m. high, glabrous throughout and with pale green foliage; leaflets 5-9, thickish, oblong, acute or acuminate, coarsely serrate, generally rounded and very oblique at the base, 5-15 cm. long, rarely with minute stipels; cyme 5-7-rayed, 4-6 cm. high and 8-15 cm. broad; flowers pure white; fruit black, but covered with a dense white bloom, 5-6 mm. in diameter. *S. glauca* Auth. *S. decipiens* M. E. Jones. *S. ferax* A. Nels. Along creeks: B.C.—Alta.—Utah—Ariz.—Calif. *Submont.*

2. *VIBURNUM* (Tourn.) L. ARROW-WOOD, CRANBERRY TREE, SNOW-BALLS.

Shrubs or small trees with simple, often stipulate leaves. Flowers in compound cymes. Hypanthium ovoid, hemispherical, or turbinate. Calyx-teeth 5. Corolla rotate to short-campanulate, regular, 5-lobed. Stamens 5; anthers oblong. Style short, 3-cleft; ovary 1-3-celled; each cell with a single ovule. Drupe 1-seeded; seed compressed.

- Leaves palmately veined, usually 3-lobed, fruit red
 Outer flowers of the cyme large, neutral and radiant.
 None of the flowers radiant
 Leaves pinnately veined, not lobed, fruit blue or black.
 Leaves coarsely dentate, pubescent.
 Leaves sharply but finely serrulate, glabrous or nearly so.
1. *V. Opulus*.
 2. *V. pauciflorum*.
 3. *V. pubescens*.
 4. *V. Lentiago*.

least to the base. Calyx 3-6-lobed; lobes valvate. Corolla wanting. Stamens as many as the calyx-lobes, opposite and adnate at the base. Ovary 1-celled, 2-4-ovuled. Fruit a drupe or nut.

1. *COMÁNDRA* Nutt. BASTARD TOADFLAX.

Smooth sometimes parasitic perennials. Leaves alternate, mostly sessile. Flowers perfect, greenish, cymose. Hypanthium campanulate or urn-shaped, enclosing and adnate to the ovary. Calyx 5-lobed. Corolla wanting. Stamens 5, inserted at the base of the calyx-lobes, anthers 2-celled, connected to the lobes by a tuft of hairs. Fruit drupe-like or nut-like.

Flowers in corymbose cymes at the end of the stem; leaves sessile; style slender.

Leaves all linear, spreading or reflexed; hypanthium in anthesis cylindrical, constricted above.

Leaves at least those of the stem lanceolate, those of the branches narrower; hypanthium in anthesis turbinate, becoming constricted later

Cymes 1-3-flowered on lateral peduncles; leaves short-petioled, style short.

1. *C. linearis* Rydb. Stem simple, 3-4 dm. high, angled; leaves all linear, spreading, pale, glaucous, 3-5 cm. long, 3-5 mm. (rarely 7 mm.) wide; hypanthium in flower 5-6 mm. long, 2.5-3 mm. thick; calyx-lobes linear-lanceolate, 3 mm. long; fruit ellipsoid, green. Dry soil: Utah. *Son.* Au.

2. *C. pallida* A. DC. Stems 2-4 dm. high, branched above, from a stout rootstock; leaves ascending, pale and glaucous, those of the stem 1-5 cm. long, 2-8 mm. wide, those of the branches much narrower; hypanthium in flower 4 cm. long; calyx-lobes lanceolate, 3 mm. long; fruit about 8 mm. long, 5-6 mm. thick, green. Sandy soil: Man.—Tex.—Ariz.—Wash.—B. C. *Son.*—*Plain*—*Submont.* Je—Au.

3. *C. livida* Richards. Stem slender, 1-3 dm. high; leaf-blades oval, thin, bright green, 1-2.5 cm. long, 6-12 mm. wide; hypanthium in flower 1.5-2 mm. long; calyx-lobes deltoid, 1 mm. long; fruit sub-globose, 6 mm. long, red. Bogs and wet places: Lab.—Vt.—Mich.—B. C.—Yukon. *Boreal.* Je—Jl.

FAMILY 127. VALERIANACEAE. VALERIAN FAMILY.

Annual or perennial herbs, usually heavy-scented, usually with dichotomously branched stems. Leaves opposite, entire or pinnately divided. Flowers perfect, monoecious or dioecious, in cymes. Hypanthium well developed, enclosing the ovary. Calyx of 3-5 sepals, sometimes elongating in fruit and pappus-like. Corolla tubular, funnelform, or salver-shaped, lobes 3-5, imbricate. Stamens distinct; anthers introrse. Gynoceum of 3 united carpels, 1-3-celled, but only one cell perfect; styles and sometimes also stigmas united. Fruit achene-like. Seed solitary, pendulous; endosperm usually wanting; embryo straight.

Sepals minute or wanting; fruit 3-celled, but only one seed-bearing.

Fruit laterally winged; stem not dichotomous.

Fruit wingless; stem dichotomous.

Calyx-lobes inrolled in flower, in fruit expanding and pappus-like; fruit strictly 1-celled.

1. PLECTRITIS.

2. VALERIANELLA.

3. VALERIANA.

1. *PLECTRITIS* DC. CORN SALAD.

Annual herbs, with simple leaves. Flowers thyrsoid-glomerate, the clusters both terminal and sessile in the upper axils. Calyx-teeth wanting. Corolla with a short tube, funnelform throat, usually bearing a descending spur, and a more or less 2-lipped limb. Ovary 3-celled, but two cells empty. Fruit 3-angular, with one angle dorsal and the other two lateral and winged.

1. *P. macroptera* (Suksd.) Rydb. Stem glabrous, 1-3 dm. high; basal leaves spatulate, 1-4 cm. long; upper leaves oblong or lanceolate; corolla pinkish, 2-3 mm. long, 2-lipped; upper lip erect, the lower one spreading; fruit pubescent, rounded on the back; wings incurved on the margins, their terminal lobes

fully as long as the beak. *Aligera macroptera* Sucksd. Sandy places: Wash.—Ida.—Utah—Ore. *Son.* Ap—Je.

2. VALERIANELLA (Tourn.) Hill. CORN SALAD, LAMB'S LETTUCE.

Annual herbs, with dichotomously branched stem. Leaves opposite, simple, entire or toothed, or rarely pinnatifid. Flowers perfect in head-like or corymbiform cymes. Calyx-teeth small or obsolete. Corolla funnelform; tube usually gibbous below; limb 5-toothed. Stamens 3. Ovary 3-celled, but only one ovule-bearing, the other two empty and more or less enlarged in the wingless fruit.

1. V. Locusta (L.) Betteke. Stem glabrous or pubescent, 2-3 dm. high; basal leaves spatulate or oblanceolate, 3-5 cm. long, entire; upper leaves oblong, sometimes denticulate; corolla blue, about 2 mm. long; fruit flattened, somewhat oval in cross-section, the two empty cells together about equalling the fertile one, the latter corky on the back. *V. olitoria* (L.) Poll. Waste places: N.Y.—Pa.—La.—Va.; nat. from Eu. Ap—Jl.

3. VALERIANA (Tourn.) L. VALERIAN, TOBACCO-ROOT.

Perennial herbs, heavy-scented. Leaves opposite, entire to pinnately divided. Flowers perfect or polygamous or polygamo-dioecious. Calyx-limb at first unrolled, at last spreading, developing into 5-15 plumose bristles. Corolla funnelform or salver-shaped, 5-lobed; tube often gibbous or saccate at the base. Stamens usually 3. Ovary 1-celled; style slightly 2-3-cleft at the apex. Fruit achene-like, flattened, 1-nerved on one side and 3-nerved on the other.

Leaves thick, the lower entire or with linear entire divisions, the veining almost parallel, plants with thick fleshy taproots.

Fruit and ovaries pubescent, bracts in the staminate plant linear-lanceolate.

1. *V. edulis*.

Fruit glabrous.

Fruit scurfy, muricate or rugose

Basal leaves oblanceolate; fruit broadly ovate, corolla of the staminate plant

2.5-3 mm wide, root thick

Basal leaves narrowly linear-oblanceolate; fruit narrowly ovate, corolla of

staminate flowers less than 2 mm. wide; root rather slender

3. *V. suffurens*

Fruit smooth, narrowly ovate, inflorescence of staminate plant rather dense, with

short branches, corolla 3-4 mm wide

Leaves thin, the cauline ones pinnate, veining distinctly pinnate, plants with rootstocks.

Bases of the stem-leaves and nodes of the stem neither ciliate nor bearded, stem finely

pruinose-puberulent

Fruit pilose, flowers perfect.

5. *V. pubicarpa*.

Fruit glabrous, plant polygamo-dioecious

6. *V. puberulenta*.

Bases of the stem-leaves and the nodes of the stem ciliate or bearded, stem otherwise

glabrous or slightly pubescent

Ovary and fruit at least when young pubescent.

7. *V. micrantha*.

Ovary and fruit glabrous

Basal leaf-blades ovate-cordate.

8. *V. ovata*.

Basal leaf-blades spatulate, oval or lanceolate, tapering at the base.

Corolla of the pistillate plants 2-3 mm long and slightly wider; inflorescence in fruit elongate and narrow.

9. *V. septentrionalis*

Corolla of the pistillate plants 3 mm or more long; inflorescence even in

fruit short, corymbiform or subcapitate.

Lateral leaflets or lobes of the stem-leaves small, linear-lanceolate,

acuminate.

10. *V. acutiloba*.

Lateral leaflets of the stem-leaves ample, ovate to lanceolate, acute.

Corolla 3-4 mm. long, leaflets from entire to slightly sinuate.

11. *V. occidentalis*.

Corolla 5-8 mm. long; leaflets from sinuate to coarsely toothed.

Leaflets sinuate or sinuate-denticulate; corolla 5-8 mm. long,

tube attenuate at the base.

12. *V. Scouleri*

Leaflets coarsely sinuate-dentate; corolla 6-8 mm. long, not conspicuously narrowed below.

13. *V. stichensis*.

1. V. edulis Nutt. Stem glabrous, 4-10 dm. high; basal leaves thick, oblanceolate, 1-2 dm. long, puberulent at least on the veins and margins; upper stem-leaves usually pinnatifid with linear approximate divisions, the upper bracts and the bractlets lanceolate, somewhat scarious, puberulent; corolla of the staminate flowers yellowish, 3 mm. broad; its tube obpyramidal, 1 mm. high, slightly hairy; corolla of the pistillate flowers less than 1 mm. high and broad;

fruit ovate, 4-5 mm. long. Hillsides and dry meadows: Mont.—Colo.—Utah—I^{da}. *Submont.*—*Subalp.* Je—Au.

2. *V. trachycarpa* Rydb. Stem glabrous or nearly so, 5-7 dm. high; basal leaves 7-18 cm. long, finely puberulent; stem-leaves 1-2 pairs, pinnatifid with linear lobes; corolla of the essentially pistillate plant 1-1.5 mm. wide; fruit not hairy, 5 mm. long, 2.5 mm. wide. Mountains: Wyo.—N.M.—Utah. *Submont.*—*Mont.* Jl—S.

3. *V. furfurescens* A. Nels. Stem glabrous, 5-10 dm. high; basal leaves 1-2 dm. long; stem-leaves few, entire or with a few approximate divisions; bracts linear; bractlets lanceolate; corolla of staminate flowers light yellow; stamens scarcely exerted; corolla of pistillate flowers about 0.5 mm. high and broad; fruit 3-4 mm. long, 1.5 mm. wide. Hillsides and mountains: Wyo.—Colo. *Submont.*—*Mont.* Jl.

4. *V. ceratophylla* (Hook.) Piper. Stem 4-8 dm. high, glabrous; basal leaves oblanceolate, puberulent on the veins and margins, 1-2 dm. long, bracts and bractlets linear or linear-lanceolate; pistillate corolla 1-1.5 mm. wide; fruit 4-5 mm. long, scarcely 2 mm. wide. *Patrinia ceratophylla* Hook. Grassy slopes and meadows: Mont.—Wyo.—Ore.—B.C. *Submont.*—*Mont.* My—Jl.

5. *V. pubicarpa* Rydb. Stem 2-4 dm. high; basal leaves spatulate or oblanceolate, 2-6 cm. long, glabrous or nearly so; stem-leaves 2-4 pairs, the lowest pair similar to the basal ones, the rest 3-5-foliate, or the uppermost simple, minute; leaflets oblong or lanceolate, 2-5 cm. long, entire; inflorescence short and dense; corolla 4-6 mm. long, 4 mm. wide, pubescent; fruit 5 mm. long. Mountains: Mont.—Utah—I^{da}. *Submont.*—*Mont.* Je—Au.

6. *V. puberulenta* Rydb. Stem 1.5-3 dm. high; basal leaves spatulate, 2-5 cm. long; stem-leaves 1-3 pairs, usually 3-foliate; terminal leaflet elliptic or oblong to lanceolate, 1-3 cm. long, the lateral ones about half as long; inflorescence of the pistillate plants corymbiform, that of the smaller staminate ones subcapitate; corolla 4-5 mm. long, 2.5-3 mm. wide, fruit nearly 5 mm. long and 2 mm. wide. Mountains: Utah. *Submont.*—*Mont.* Je—Au.

7. *V. micrantha* E. Nels. Stem glabrous or nearly so; basal leaves entire or with 1-2 pairs of small rounded or oblong lobes on the petioles; blades or terminal leaflets ovate or elliptic, 3-7 cm. long; cauline leaves with 5-7 elliptic to lanceolate leaflets; cyme as broad as high or broader; corolla white, the staminate ones 2-3 mm. broad and high, the pistillate barely 2 mm.; achenes narrowly ovate, 3-4 mm. long, pubescent, at least when young. Mountains: Mont.—Colo.—Utah—I^{da}. *Submont.*—*Mont.* Jl—Au.

8. *V. ovata* Rydb. Stem about 3 dm. high, glabrous; basal leaves entire, petioled, glabrous; blades ovate, usually truncate or slightly cordate at the base; stem-leaves 2-3 pairs; lateral lobes oblong to linear-lanceolate, the terminal one lanceolate or of the lower leaves elliptic; inflorescence small and corymbiform; corolla funnelform-salvershaped, about 8 mm. long; limb of the fertile flowers about 4 mm. wide, that of the staminate ones about 6 mm. wide; fruit ovate, glabrous, 4 mm. long. Wooded hillsides: Colo.—N.M. *Mont.* My—Jl.

9. *V. septentrionalis* Rydb. Stem weak and slender, 2-5 dm. high, glabrous or nearly so; basal leaves usually entire; blades spatulate or elliptic, 2-5 cm. long; stem-leaves usually 2 pairs, with 3-7 leaflets; terminal leaflet usually elliptic, twice as large as the lanceolate lateral ones, fruit 4 mm. long, 1.5 mm. wide. *V. wyomingensis* E. Nels. Hillsides and meadows: Lab—Que—Nev.—B.C. *Submont.*—*Mont.* My—Jl.

10. *V. acutiloba* Rydb. Stem of fertile plant 4-5 dm. high; basal leaves entire, 5-7 cm. long; blade spatulate or obovate, acute; stem-leaves usually 3 pairs, pinnately divided; lateral divisions lanceolate to linear, long-acuminate, the terminal one large, oblanceolate or of the upper leaves linear-lanceolate, entire or saliently toothed; cyme dense, contracted; corolla about 4.5 mm. long; fruit broadly ovate, about 4 mm. long; staminate plant lower, 3-4 dm. high, with more sterile shoots; stem-leaves usually only 2 pairs, less divided, with only 1-2 pairs of lateral divisions; cymes denser; corolla 5-6 mm. long, more

oblique, about 5 mm. wide. Mountains: Wyo.—N.M.—Utah. *Mont.*—*Alp.* Je—Au.

11. *V. occidentalis* Heller. Stem 5–8 dm. high, glabrous or sparingly puberulent; basal leaves petioled, thin, simple, elliptic or spatulate, entire, 2–8 mm. long; stem-leaves 2–4 pairs, pinnate, with 3–9 leaflets, those of the lower leaves elliptic, those of the upper narrowly lanceolate; inflorescence open; corolla white, of the pistillate flowers, 3–3.5 mm long, 3–4 mm. broad; fruit glabrous, 5 mm. long, 2 mm. wide. Wet places in the mountains: *Mont.*—*Colo.*—*Utah*—*Wash.*—*B.C.* *Submont.*—*Mont.* Je—Au.

12. *V. Scouleri* Rydb. Stem glabrous; basal leaves simple or 3–5-foliolate; blade or terminal leaflet obovate or orbicular, the lateral ones elliptic; stem-leaves 3–7-foliolate; leaflets oval or elliptic or those of the upper leaves lanceolate; flowers usually perfect; corolla white; fruit glabrous, 6 mm. long, 2 mm. wide. Wet places: B.C.—*Alta.*—*Mont.*—*Ore.* *Submont.*—*Mont.* Je—Au.

13. *V. sitchensis* Bong. Stem 4–7 dm. high, glabrous or nearly so; stem-leaves 3–5-foliolate; leaflets of the lower ones broadly ovate, of the upper lanceolate, 5–8 cm. long, sparingly pilose or nearly glabrous; basal leaves similar or simple, usually none at flowering time; cyme short and corymbiform; flowers mostly perfect; fruit glabrous, 6 mm. long, 2 mm. broad. Wet places: *Alaska*—*Ore.*—*Ida.*—*Yukon.* *Submont.*—*Mont.* Jl—Au.

FAMILY 128. **ARISTOLOCHIACEAE.** BIRTHWORT FAMILY.

Perennial herbs or vines. Leaves alternate, or basal, petioled. Flowers perfect, regular or irregular. Hypanthium usually well developed, often wholly enclosing the ovary. Calyx regular or irregular, mostly of 3 sepals. Corolla wanting. Stamens 6 to many; filaments either free or adnate to the style column. Styles united; ovary 4–6-celled; ovules many in each cavity. Fruit a capsule. Seeds numerous; endosperm fleshy.

1. **ASARUM** (Tourn.) L. WILD GINGER.

Perennial acaulescent herbs, with elongate rootstocks. Leaves 2, basal, petioled; blades cordate or reniform. Flowers perfect, regular, solitary, on a scape arising between the leaves. Hypanthium well developed, campanulate, enclosing the ovary, angled. Sepals 3, inflexed in bud. Stamens 12, free. Ovary inferior, 6-celled; styles 6, united.

1. *A. caudatum* Lindl. Leaf-blades cordate-reniform, acutish at the apex, sparingly pubescent on the veins, 5–10 cm broad; peduncle 1–3 cm. long; calyx-lobes lanceolate, caudate-attenuate, 2.5–5 cm. long. Woods and thickets: B.C.—*Ida.*—*Calif.* *Submont.*—*Mont.* Ap—Jl.

FAMILY 129. **CUCURBITACEAE.** GOURD FAMILY.

Annual or perennial succulent herbs, trailing or climbing by means of tendrils. Leaves alternate, palmately veined or lobed, usually rough-hairy. Flowers usually axillary, monoecious or dioecious. Calyx of 4–6, more or less united sepals, imbricate. Corolla of as many petals which are more or less united. Stamens 1–5, often 3, two with 2-celled and one with 1-celled anthers; filaments distinct or united; anthers extrorse, often twisted. Gynoeceium of a compound pistil; ovary 1–3-celled; styles terminal, united; stigma thick, dilated, or ringed. Fruit a pepo (large fleshy or dry berry with thick rind). Seeds usually numerous, flat and horizontal; endosperm wanting; embryo straight, with thick cotyledons.

Fruit large, with a tough rind, 1-celled, with 3–5 placental and numerous seeds; corolla large, yellow, campanulate, flowers solitary in the axils
 Fruit spiny, becoming papery and spongy, 2–3-celled, seeds few, corolla white, rotate;
 staminate flowers racemose or paniculate.

1. **CUCURBITA.**
 2. **MICRAMPELIS.**

Staminate and pistillate flowers in different heads, the latter 1-4, without corolla and enclosed in a nut-like or bur-like involucre

Involucres of the staminate heads with united bracts, receptacles low, rudimentary styles penicillate or fimbriate at the apex

Involucres of the solitary pistillate flower with 9-12 dilated scarious wings, anther-tips blunt

Involucres of the 1-4-flowered pistillate heads not winged, but usually armed with spines or tubercles, anther setiferous-acuminate

Spines or tubercles of the 1-flowered pistillate heads in a single row

Spines of the 1-4-flowered pistillate heads in more than one row

Involucres of the staminate heads with distinct bracts, receptacle cylindrical, spines of the 2-flowered pistillate heads in several rows, uncinata

1. OXYTÈNIA Nutt.

Small shrubs. Heads small; involucres of 5 coriaceous-herbaceous, dilated, ovate, rigidly acuminate bracts. Receptacle convex. Staminate flowers 10-20, villous at the base, subtended by slender paleae, or these wanting in the central flowers; pistillate flowers 5, without a trace of corolla. Achenes obovate-turgid, very villous. Pappus none or of a single minute scale.

1. *O. acerosa* Nutt. Shrub 1-2 m. high, canescent; branches erect, often leafless and rush-like; leaves alternate, pinnately 3-7-parted, with filiform divisions, 3-12 cm. long, or the upper entire and filiform; heads numerous, in dense panicles, about 4 mm. high; bracts ovate, mucronate, canescent. Dry plains and cañons: sw Colo.—N.M.—see Calif. Son. Au.

2. CYCLACHAENA Fresen. HORSEWEED, CARELESS WEED

Annual herbs, with mostly opposite petioled leaves. Heads paniculate, not leafy-bracteate. Involucres of 5 obovate bracts. Receptacle chaffy, the paleae subtending the pistillate flowers broad, nearly as large as the bracts, partly embracing the achenes. Fertile flowers 5, marginal, their corollas none or rudimentary. Staminate flowers 10-15, with funnelliform corollas. Filaments monadelphous. Achenes pyriform, without pappus.

1. *C. xanthifolia* (Nutt.) Fresen. Stem 1-2 m. high, puberulent above; leaf-blades ovate or ovate-lanceolate, cuneate to subcordate at the base, 5-10 cm. long, canescent beneath, scabrous above; heads 4-5 mm. broad, hemispheric; bracts ovate. *Iva xanthifolia* Nutt. Waste places and along streams. Sask.—Mich.—Neb.—N.M.—Wash.—Alta. Plain—Submont. Jl-S

3. IVA L. MARSH ELDER, BOZZLEWEED, SALT SAGE, POVERTY WEED.

Annual or perennial herbs, or shrubs. Leaves opposite or alternate above, glabrous or coarsely pubescent. Heads axillary or in terminal bracteate spikes. Involucres campanulate or hemispheric, or turbinate; bracts 3-6, distinct or partially united. Pistillate flowers 1-8, marginal; corolla a short truncate tube. Disk-flowers perfect but sterile, with funnelliform, 5-lobed corollas. Anthers entire at the base, mucronate above. Achenes broadest above the middle, without pappus.

1. *I. axillaris* Pursh. Perennial, suffrutescent at the base; stems much branched, 2-6 dm. high, sparingly hirsute or glabrate; leaves sessile, entire, obovate, oblong, or linear-oblong, 1-3 cm. long, fleshy, pubescent or glabrate, the upper alternate; heads axillary, 4-5 mm. broad, hemispheric; bracts of the involucres 4-5, connate at least at the base; pistillate flowers 4-5, staminate flowers 12-15. Alkaline or saline meadows: Man.—Okla.—N.M.—Calif.—B.C. Plain—Submont. My-S.

4. DICORIA T. & G.

Branched annuals. Lower leaves opposite, the upper alternate. Involucre of 5, oval or oblong, herbaceous bracts; within these 1 or 2 large, broad, thin-scarious paleae subtending the 1 or 2 pistillate flowers, or these lacking when the heads are wholly staminate. Staminate flowers 6-12, with rudimentary pistils, subtended by a few narrow, hyaline paleae, corollas of the staminate flowers

obconic. Filaments monadelphous. Corolla of the pistillate flowers wanting. Achenes oblong, flat on the inside, convex or angled on the outside, with thin-scarious, pectinately dentate wings. Pappus rudimentary, of a few small bristle-like scales.

Upper leaf-blades broadly spatulate, ovate, or roundish.

Inner bracts 10-15 mm. long, achenes with pectinate margins. 1. *D. Wetherillii*.
Inner bracts 6-8 mm. long; achenes with continuous erose margins 2. *D. canescens*

Leaves all oblong-lanceolate to linear.

Fertile flowers solitary in the heads; teeth of the achenes connected by a scarious margin 3. *D. Brandegei*

Fertile flowers 2 in each head; achenes without scarious margins. 4. *D. paniculata*.

1. *D. Wetherillii* Eastw. Stems strigose; leaves spatulate, hirsute-canescenscent with appressed hairs; staminate flowers several, longer than the outer bracts; pistillate flowers usually 2; inner bracts hood-shaped, enclosing the achenes, 10-15 mm. long, 10 mm. broad, intricately veined, pitted, glandular-hairy; achenes oblong, mottled with brown, sparingly glandular. Sandy places: s Utah. *L. Son.*

2. *D. canescens* T. & G. Stem intricately branched, 3-10 dm. high, hispidulous; lower leaves opposite, lanceolate or oblong, coarsely toothed, the upper alternate, round-ovate or orbicular, white with appressed pubescence, 1-3 cm. long, crenate; fertile flowers 2; inner bracts petaloid, orbicular, concave; staminate flowers many. Desert washes: se Calif.—Ariz.—s Utah. *L. Son.*

3. *D. Brandegei* A. Gray. Stem diffusely branched, 3-10 dm. high, canescent-hispid; leaves petioled; blades 1-5 cm. long, strigose-canescenscent, sinuate-denticulate; heads few, some wholly staminate; fertile flowers solitary; inner bracts dilated-cuneate, rather small. Sandy bottoms: s Colo.—s Utah—Ariz. *Son. Au.*

4. *D. paniculata* Eastw. Stem 3-5 dm. high, branched from the base, hispid-canescenscent; leaf-blades sparingly dentate or entire, 1-2 cm. long; heads numerous, paniculate; inner bracts large, truncate or obcordate, suborbicular, glandular-ciliate; fertile flowers 2; achenes obovate, 6 mm. long, dark brown, dentate with horny teeth; staminate flowers 9-10. Sandy flats: sw Colo.—se Utah. *Son.*

5. HYMENOCLEA T. & G.

Low shrubs. Heads unisexual, monoecious. Involucres of the staminate heads saucer-shaped, of 4-6 more or less united bracts; paleae of the receptacle subtending the outer flowers obovate or spatulate, those of the inner flowers filiform or none. Filaments distinct; anther-tips blunt; the abortive styles with dilated fimbriate or penicillate tips. Involucres of the 1-flowered pistillate heads ovoid or fusiform, beaked, with 9-12 dilated and silvery-scarious persistent transverse wings on the lower portion.

1. *H. Salsola* T. & G. Low shrubs, much branched, puberulent; leaves alternate, linear-filiform, 1-5 cm. long; heads numerous, paniculate; staminate heads hemispheric, 5 mm. broad, many-flowered; bracts of the pistillate involucre spirally arranged, imbricate, when dry spreading, suborbicular, 6-8 mm. broad, silvery-scarious. Saline soil: s Calif.—Nev.—s Utah—Ariz. *L. Son.*

6. AMBRÒSIA (Tourn.) L. RAGWEED, ROMAN WORMWOOD, BITTER-WEED.

Annual or perennial, often more or less woody, caulescent herbs, mostly monoecious, rarely dioecious. Leaves opposite or alternate, usually much divided, or rarely merely toothed. Staminate heads in terminal spikes or racemes. Involucres saucer-shaped or hemispheric, with 5-12 partly united bracts; receptacle naked or with filiform paleae. Corollas funnelform, 5-lobed. Anthers mucronate at the apex; style rudimentary, brush-like at the apex. Pistillate involucres enclosing the single flower, turbinate or subglobose, with several tubercles or spines in a single series. Corolla wanting. Stigmas filiform. Achenes ovoid or obovoid; pappus wanting.

Involucres of the staminate heads 3-ribbed; leaves palmately 3-5-cleft or entire

1. *A. trifida*.

Involucres of the staminate heads not ribbed; leaves once to thrice pinnatifid

Annual; fruit with acute teeth

Leaves thin, not strongly veined, bipinnatifid.

2. *A. elatior*.

Leaves thick, strongly veined, pinnate with broad toothed or cleft segments

3. *A. media*.

Perennial with rootstock; fruit with unarmed or blunt tubercles.

4. *A. psilostachya*

1. *A. trifida* L. Annual; stem 1-5 m. high, more or less hispid; leaves petioled; blades scabrous on both sides, ovate in outline, 3-5-cleft or entire, serrate, acute or acuminate; sterile racemes many; heads nodding; involucre 3-ribbed on the back, slightly hispidulous or glabrous; fruit 6-7 mm. long, turbinate, 3-5-ribbed, with as many conical tubercles. Moist and waste places: Que.—Fla.—Colo.—B.C. *Plain*. JI-O.

2. *A. elatior* L. Annual; stem 3-10 dm. high, strigose and ciliate; leaves with ciliate petioles, thin, hispidulous or glabrate above, more or less grayish-strigose beneath, bipinnatifid, with lanceolate, acute divisions; staminate heads nodding, oblique, about 3 mm. broad, puberulent or in the western form more ciliate-pilose; fruit obovoid; body slightly pubescent or glabrate, 2.5-3 mm. long, with 5-7 sharp spines about 0.5 mm. long; beak 1-1.5 mm. *A. artemisiæ-folia* A. Gray, not L. Waste places: N.S.—Va.—Colo.—Wash.—B.C. *Plain*—*Submont.* Au-O.

3. *A. media* Rydb. Annual; stem 4-6 dm. high, hispid and strigose; leaves pinnatifid, or the upper merely cleft, 5-10 cm. long, scabrous above, hispid-strigose beneath; divisions lanceolate, the lower lobed or toothed; staminate heads numerous; involucre 5-lobed and crenulate, 4-5 mm. broad, hispid-strigose; fruit obovoid; body 3 mm. long, puberulent; beak 1 mm. long, pubescent; spines 5-7, sharp, subulate, 0.5 mm. long. Dry places: S.D.—Kans.—N.M.—Nev.—Wash. *Plain*—*Submont.* JI-O.

4. *A. psilostachya* DC. Stem 3-8 dm. high, canescent-strigose; leaves sessile or the lower with short broadly-winged petioles, grayish-strigose on both sides, thick and strongly veined, pinnatifid; divisions entire, toothed or cleft, lanceolate, acute; staminate heads nodding, oblique, 3 mm. wide; fruit round-elliptic; body pubescent, 3-3.5 mm. long, usually unarmed, sometimes with obtuse tubercles. *A. coronopifolia* T. & G. Prairies and plains: Ill.—Sask.—La.—Calif.—Ida. *Plain*—*Submont.* JI-O.

7. FRANSERIA Cav.

Annual or perennial herbs, rarely shrubby, resembling *Ambrosia*. Leaves mostly alternate, lobed or pinnatifid. Heads monoecious, the staminate ones in terminal racemes or spikes. Involucres hemispheric, open, with 5-12 more or less united bracts; receptacle chaffy. Corollas short, 5-lobed. Anthers scarcely coherent. Styles rudimentary, simple. Pistillate heads solitary or in small clusters below the staminate or rarely mixed with them. Involucres closed, globose or ovoid, beaked, enclosing 1-4 pistils, with several processes in more than one series, becoming bur-like at maturity. Stigmas 2. Achenes obovoid. [*Gaertneria* Medic.]

Fruit not villous

Spines of the fruit flat, never hooked.

Plant shrubby, leaves silvery white; pistillate heads mostly 2-flowered and 2-beaked

1. *F. albicaulis*.

Plant annual; leaves strigose, not white; pistillate heads 1-flowered and 1-beaked

Leaves bi- or tri-pinnatifid

2. *F. acanthocarpa*

Leaves pinnately 3-5-cleft.

3. *F. montana*.

Spines terete, usually more or less curved.

Bur 1-beaked, 1-2-flowered; leaves not tomentose beneath

Annual, divisions of the leaves oblong or linear-oblong, acute

4. *F. tenuifolia*.

Perennial with a suffrutescent base; leaf-segments linear, obtuse

5. *F. linearis*

Bur 2-beaked, 2-flowered; leaves tomentose beneath; plants perennial with a rootstock.

Leaves interruptedly pinnatifid, with lobed or coarsely toothed divisions.

6. *F. discolor*.

Leaves pinnately 3-5-parted or entire; divisions or blades merely serrulate or entire
 Fruit villous; plant shrubby.

7. *F. tomentosa*.
 8. *F. eriocentra*

1. *F. albicaulis* Torr. Low shrub, often spinescent, divaricately branched, with white bark, 3-10 dm. high; leaves pinnate or bipinnate, silvery white; segments small, obovate, usually toothed; spike solitary; pistillate heads often mixed with the staminate ones, the latter about 4 mm. broad; involucre canescent, lobed to the middle; fruit about 8 mm. long; spines flattened, subulate, spreading or recurved in age. Desert regions: s Utah—Nev.—Calif.—Ariz.; n Mex. *L. Son.* Mr—My.

2. *F. acanthocarpa* (Hook.) Coville. Annual; stem erect, diffusely branched, 3-6 dm. high, hirsute or hispid, with white hairs; leaves petioled or the upper sessile, bi- or tri-pinnatifid; divisions or their lobes oblong, elliptic or linear, hispid-strigose on both sides or glabrate above; staminate heads nodding, about 3 mm. broad; involucre dark brown with 3 blackish ribs, cleft beyond the middle into 6-7 oval lobes; fertile heads 1-flowered; fruit 12-20 mm. long, with 7-12 flattened lance-subulate divergent spines. *F. Hookeriana* Nutt. *Gaertneria acanthocarpa* Britton. Plains and sandy valleys: Sask.—Mo.—Tex.—Calif.—B.C. *Son.*—*Submont.* Jl—O.

3. *F. montana* Nutt. Annual; stem 3-6 dm. high, strigose or hispidulous, angled, branched; leaves petioled, ovate in outline, pinnately 3-5-divided, hispidulous-strigose on both sides; divisions ovate or obovate, or the terminal one rhombic, often 2-3-cleft and round-lobed; staminate heads similar to those of the preceding, but the involucre scarcely cleft to the middle; fruit similar but 1 cm. long or less, and spines more crowded. Sandy places: Utah—Ore.—*se Calif.* *Son.* Au—O.

4. *F. tenuifolia* Harv. & Gray. Perennial; stem 3-15 dm. high, pubescent or nearly glabrous; leaves bi- or tri-pinnatifid into oblong or linear divisions, strigose; staminate heads about 4 mm. broad; involucre pilose, lobed to near the middle; bur 1-2-flowered, but with a single beak, glandular-puberulent and with a depression above each hooked spine. Valleys: Tex.—Colo.—*a Calif.*; Mex. *Son.* My—N.

5. *F. linearis* Rydb. Perennial, shrubby at base; stems about 2 dm. high, sparingly hirsute, branched; leaves once or twice pinnate, 3-4 cm. long, strigose above, minutely tomentulose beneath; lobes linear, obtuse, 3-5 mm. long; staminate heads nodding, 3-4 mm. wide; involucre strigose, cleft scarcely half-ways into rounded-ovate lobes; pistillate involucre with few hooked slender spines. *G. linearis* Rydb. Dry plains: Colo. *Submont.* Jl.

6. *F. discolor* Nutt. Perennial with a rootstock; stem 2-4 dm. high, sparingly pubescent; leaves petioled, interruptedly pinnatifid, strigose above, white-tomentose beneath; larger division oblanceolate, cleft and with triangular teeth; staminate racemes usually solitary; heads about 5 mm. wide; involucre finely pubescent, with 5-8 short, lobes; pistillate heads 2-flowered; fruit ovoid, 4-5 mm. long; spines short, with conic bases and usually slightly curved tips; beaks 2, short, hooked at the apex. *Gaertneria tomentosa* (Nutt.) Heller. Dry soil: S.D.—Kans.—Ariz.—Wyo. *Plain*—*Submont.* Jl—Au.

7. *F. tomentosa* A. Gray. Perennial; stem 3-10 dm. high, strict, purplish, somewhat tomentose or glabrate below; leaves pinnately 3-5-parted or entire, white-tomentose on both sides or grayish above; blades or divisions lanceolate-serrate; staminate racemes paniculate; heads about 4-5 mm. broad; involucre tomentose, round-lobed; bur 6-8 mm. long, glandular-puberulent, 2-flowered, 2-beaked, with terete hooked spines. *Gaertneria Grayi* A. Nels. River bottoms: Neb.—Kans.—Colo. *Plain.* Au—S.

8. *F. eriocentra* A. Gray. Low shrub, with gray bark, minutely tomentose; leaves 2-4 cm. long, oblanceolate or cuneate-oblong, soon glabrate above, white-tomentulose beneath, coarsely sinuately toothed or lobed; staminate heads few, in short, terminal racemes, 6-7 mm. broad; involucre canescent, with triangular lobes; fruit about 1 cm. long, the beak equalling the body; spines slender, slightly

Receptacle not chaffy, style or style-branches of the hermaphrodite flowers mostly truncate

Plants dioecious, or the pistillate heads with a few hermaphrodite flowers in the center

Pappus-bristles of the pistillate flowers falling off in a ring; central hermaphrodite flowers none 55. ANTENNARIA.

Pappus-bristles of the pistillate flowers falling off separately; central hermaphrodite flowers present in the pistillate heads 56. ANAPHALIS

Plants not dioecious, flowers fertile throughout the heads, hermaphrodite in the middle, surrounded by pistillate ones. 57. GNAPHALUM.

Tribe 5. ADENOCALULEAE.

Leaves cordate, white-woolly beneath

58. ADENOCALULON.

Tribe 6. HELIANTHEAE

A Bracts (at least the outer series) not enclosing the achenes of the rays; plants not glandular-viscid

I. Disk-flowers hermaphrodite but sterile.

Marginal pistillate flowers, with conspicuous rays

Achenes not flattened, ligules in ours white, involucre of very dissimilar sets of bracts. 59. MELAMPODIUM.

Achenes flattened, ligules in ours yellow

Ray-flowers in 2-3 series, achenes falling away free

60. SILPHIUM

Ray-flowers in 1 series, achenes adnate to 2 or 3 paleae and falling away with them 61. ENGELMANNIA.

Marginal pistillate flowers reduced to a truncate or obliquely-cleft tube; the ligules, if any, reduced to 2 or 3 small teeth

Acaulescent caespitose perennials; pappus of a pair of lanceolate membranous scales 62. BOLOPHYTA

Caulescent annuals, pappus none 63. PARTHENICE

II. Disk-flowers fertile

a. Ray-flowers fertile, the ligules with very short tube, persistent on the achenes and becoming papery in texture

Achenes of the disk compressed, leaves entire

64. CRASSINA.

Achenes obtusely 4-angled

Leaves toothed, paleae pointless, partly enclosing the achenes.

65. HELIOPSIS

Leaves entire, paleae linear-lanceolate, not enclosing the achenes (*Kalliacis*, *i. e.*, *B. Careyana*, of)

71. BALSAMORRHIZA

b Ray-corollas deciduous from the achenes or wanting

1 Pappus a crown or none, or of a few squamellae on the angles of the achenes, and rarely minute ones between

a Achenes of the disk-flowers not obcompressed (except in *Ratibida* and *Ximenesia*) paleae usually more or less concave and clasping

Receptacle conic, subulate or columnar

Achenes 4-angled

Ray-flowers purplish or rarely whitish, disk-corollas almost without a tube, pappus coroniform 66. BRACNERIA

Ray-flowers yellow or none, disk-corollas with a short but manifest tube

Achenes quadrangular-compressed; apex of the achenes covered by the base of the corolla-tube

67. GYMNOLOMIA

Achenes nearly equally 4-angled, apex not covered by the base of the corolla

68. RUBECKIA

Achenes 5-angled, ray-flowers white.

70. GALINSOGA

Achenes flattened, broad-margined or winged

69. RATIBIDA

Receptacle from flat to convex

Achenes of the disk neither sharp-angled, margined, nor winged.

Rays fertile, their achenes commonly 3-angled or obcompressed, plants with thick balsamiferous taproots

Pappus none; stem scapiform or with reduced leaves

71. BALSAMORRHIZA

Pappus a lacerate chaffy crown or of distinct squamellae, stem low but leafy

72. WYETHIA.

Rays sterile or wanting, plants not with fleshy taproot

Pappus none or a minute ring 67. GYMNOLOMIA

Pappus of 2 scarious awns 73. HELIANTHUS

Achenes of the disk thin-edged, margined or winged.

Ray-flowers neutral, achenes scarcely winged

Pappus none or an awn to each angle of the achenes

74. ENCELIA

Pappus of small teeth between the 2 or more awns or scales over the angles of the achenes

Plants scapose; achenes with a callous margin.

75. ENCELIOPSIS

Plants caulescent; achenes not margined

76. HELIANTHELLA

- Ray-flowers fertile; achenes winged; pappus-awns without intermediate squamellae. 77. XIMENESIA.
- b Achenes obcompressed, paleae flat or hardly concave; involucre distinctly double
- Bracts of the involucre distinct or nearly so
- Pappus in ours of small teeth, a mere border, or wanting. 78. COREOPSIS.
- Pappus of 2-4 barbed or hispid awns 79. BIDENS.
- Bracts of the inner involucre united at least to near the middle 80. THELESPERMA.
2. Pappus of 5-many, linear to lanceolate squamellae with thickened axis and hyaline margins
- Rays fertile, paleae of the receptacle thin and scarious; pappus-squamellae fimbriate. 81. PTILONELLA.
- Rays sterile, paleae of the receptacle bristle-form, pappus-squamellae not fimbriate. 110. GAILLARDIA.
- B. Bracts of the involucre uniserial, partly or wholly enclosing the achenes of the fertile ray-flowers; plants glandular-viscid
- Achenes of the inconspicuous rays laterally compressed and enclosed in the con-duplicate infolded involucre bracts
- Disk-flowers several, corolla hairy, stout annuals with sessile or short-peduncled heads. 82. MADIA.
- Disk-flowers solitary; corolla glabrous, slender low annuals with small heads on filiform peduncles. 83. HARPAECARPUS.
- Achenes of the ray-flowers with broad and rounded backs, or more commonly obcom-pressed.
- Ligules of the ray-flowers minute; achenes completely invested by the whole involucre bract, disk-flowers solitary; heads small and short-peduncled 84. HEMIIONELLA.
- Ligules of the ray-flowers conspicuous; achenes enclosed in the basal portion of the bracts, the dilated margins of which are abruptly infolded, disk-flowers several or many
- Ray-flowers about 5, with deeply 3-cleft ligules, disk-flowers sterile, without pappus 85. LAGOPHYLLA.
- Ray-flowers 8-20, with merely 3-lobed or toothed ligules, disk-flowers mostly fertile with pappus of 5-20 bristles. 86. BLEPHARIPAPPUS.
- Tribe 7. HELENIAE
- I. Ligules persistent and becoming papery on the striate achenes; plants more or less woolly
- Pappus of scales, rays 3-4, very broad, involucre of 4-10 coriaceous woolly bracts 87. PSILOSTROPHE.
- Pappus none; rays 5-50, involucre of numerous thin herbaceous bracts. 88. BAILEYA.
- II. Ligules deciduous or none.
- A. Achenes flat with only marginal nerves, disk-corollas 4-toothed.
- Pappus none or of a single bristle, bracts distinct; suffruticose plants 89. MONOTRICH.
- Pappus of a lacerate-ciliate crown and sometimes with an additional pair of short awns; bracts more or less connate, not suffruticose plants. 90. PERICOME.
- B. Achenes angled, not flat, nerved or striate.
- 1 Receptacle naked.
- a. Bracts of the involucre pale or colored, at least the margins and tips scarious
- Corollas of the disk-flowers with reflexed or spreading lobes, bracts of the broadly campanulate involucre obovate or broadly oblong
- Heads discoid. 96. HYMENOPAPPUS.
- Heads radiate, ligules obscurely toothed, yellowish or white 97. LEUCAMPYX.
- Corolla of the disk-flowers with linear, erect lobes; bracts of the turbinate involucre spatulate to linear-oblongate in two series; ligules if present deeply cleft, purple. 98. OTHAKE.
- b. Bracts of the involucre neither colored nor scarious.
- Pappus of numerous barbellulate white bristles, somewhat broadened and united at the base into a ring. 104. SYNTRICHOPAPPUS.
- Pappus of scales or wanting.
- Achenes either linear-prismatic or clavate-obpyramidal, i. e., very elongate
- Bracts more or less carinate-concave and partly enfolding the achenes; leaves more or less floccose woolly.
- Low and diffuse winter annuals; anther-tips subulate, bracts herbaceous; tube of the disk-corollas equalling the throat 103. ANTHEROPEAS.
- Perennials; anther-tips obtuse; bracts firm; tube of the disk-corollas shorter than the throat. 102. ERIOPHYLLUM.
- Bracts wholly herbaceous, broad and flat or merely concave, not embracing the achenes; plants not floccose-lanate
- Foliage impressed-punctate; leaves at least the lower opposite.
- Perennials, suffruticose at the base; leaf-segments oblong to linear. 91. PICRADENIOPSIS.

- Annuals; leaf-segments filiform or nearly so.
 95. CEPHALOBEMBIX.
 Foliage not impressed-punctate; leaves alternate.
 Bracts obovate, cuneate or oblanceolate.
 Perennials with a woody caudex; leaves entire; pappus of
 10 squamellae. 93. PLATYSCHUKURIA.
 Annuals, leaves dissected; pappus wanting.
 92. AMAURIOPSIS.
 Bracts linear.
 Bracts in one row or two subequal rows; plant not fleshy;
 achenes linear
 Heads radiate, but ligules inconspicuous; pappus of
 opaque squamellae. 99. RIGIOPAPPUS.
 Heads discoid, pappus of hyaline squamellae
 Achenes angled; squamellae with strong midribs.
 100. CHAMAECHENACTIS
 Achenes scarcely angled; squamellae not conspic-
 uously ribbed 101. CHAENACTIS.
 Bracts in 2-3 rows, heads radiate; leaves more or less
 fleshy. 94. HULSEA.
 Achenes obpyramidal, not 4 times as long as broad.
 Bracts of the involucre erect, not spreading nor reflexed
 Involucres many-flowered; pappus present; achenes tapering
 below.
 Bracts of the involucre nearly equal and similar, all distinct.
 Bracts few; corolla flesh-colored, rays wanting
 100. CHAMAECHAENACTIS.
 Bracts numerous, corollas yellow, rays usually present
 Leaves entire; squamellae short, obtuse or abruptly
 contracted into a point. 105. TETRANEURIS.
 Leaves pinnatifid, squamellae linear-lanceolate, at-
 tenuate but not awn-tipped
 106. RYDBERGIA.
 Outer bracts united below; leaves usually pinnatifid with
 narrow divisions 107. HYMENOXYS.
 Involucres few-flowered, pappus wanting; achenes linear, 8-10-
 striate 108. FLAVERIA.
 Bracts of the involucre spreading or reflexed.
 Leaves not decurrent on the stem, tubes of the disk-flowers
 moderately long 109. DUGALDIA.
 Leaves decurrent on the stem; tubes of the disk-corollas very
 short or reduced to a ring 110. HELENUM.
 2 Receptacle with bristle-like chaffs
 Involucral bracts spreading or reflexed 111. GAILLARDIA.
 Involucral bracts erect. 101. CHAENACTIS.
 Tribe 8 TAGETAEAE.
 Bracts of the involucre more or less united; style-branches of the disk-flowers elongate
 Bracts of the involucre united only at the base; style-branches with conical tips;
 squamellae of the pappus many-auristate 112. BOEBERA.
 Bracts of the involucre united into a cup, style-branches obtuse.
 113. THYMOPHYLLA
 Bracts of the involucre distinct, style-branches very short, obtuse, without an appendage.
 114. PECTIS.
 Tribe 9 ANTHEMIDEAE.
 Receptacle chaffy
 Achenes flattened; involucre campanulate or obovoid, small; ligules short and broad.
 115. ACHILLEA
 Achenes terete, at least not flattened, involucre hemispherical, large; ligules elongate.
 Ray-flowers fertile, paleae of the receptacle membranous, subtending all the
 flowers 116. ANTHEMIS
 Ray-flowers neutral; paleae of the receptacle subulate, stiff, subtending only the
 inner disk-flowers. 117. MARUTA.
 Receptacle naked or merely pubescent.
 Heads radiate; achenes 5-10-ribbed all around.
 Ligules white, flat, spreading, longer than the disk-corollas
 119. LEUCANTHEMUM.
 Ligules yellow, concave, erect, not longer than the disk-flowers
 120. TANACETUM.
 Heads in ours discoid, achenes 2-5-ribbed.
 Anthers obtuse.
 Heads solitary, peduncled; flowers in our species all alike (the ray-flowers
 found in other species lacking) 118. CHAMOMILLA
 Heads in contracted panicles or glomerules, or in one species solitary, flowers
 of two kinds, the marginal pistillate, but without ligules.
 121. SPHAEROMERIA.
 Anthers with pointed tips; heads racemose, rarely solitary; marginal pistillate
 flowers without ligules.
 Plants spiny; achenes and corollas cobwebby. 122. PICROTHAMNUS.
 Plants not spiny; achenes not cobwebby 123. ARTEMISIA.

Tribe 10. SENECEONEAE

- Plants scapiferous, dioecious or nearly so, with large basal leaves appearing after flowering; hermaphrodite flowers usually sterile 124 PETASITES
 Plants not scapiferous, not dioecious; disk-flowers hermaphrodite, fertile
 Involucres of many or several bracts
 Involucres lax, of commonly much overlapping or unequal bracts
 Low annual herbs, with alternate leaves
 Heads discoid; receptacle flat, corollas with very short tube 126 PSATYROTES
 Heads radiate; receptacle conical, disk-flowers with long tube 125 CROCIDIUM
 Suffrutescent perennial, with opposite leaves, heads radiate 127. HAPLOESTES
 Involucres of connivent erect herbaceous equal bracts, with or without smaller calyculate ones below
 Leaves mostly opposite, pappus of a single series of rigid bristles 128. ARNICA
 Leaves alternate, pappus of numerous soft bristles 129 SENECEO
 Involucres of 4-6 firm concave erect and strongly overlapping bracts, shrubs with alternate leaves and discoid heads 130 TETRADYMIA

Tribe 11. CYNAREAE

- Achenes attached by the very base, flowers all alike or nearly so, hermaphrodite
 Leaves not prickly; filaments glabrous, style-branches slender, free
 Involucre globose, bracts subulate, spine- or awn-like, spreading, hooked at the tip 131 ARCTIUM
 Involucre oblong or obovoid, bracts appressed, mucious 132 SAUSSUREA
 Leaves more or less prickly; filaments bearded or papillose, rarely glabrous, style-branches more or less united into a cylindrical body with a hair-ring below
 Receptacle densely bristly; pappus plumose 133 CIRSIUM
 Receptacle deeply honeycombed, scarcely bristly, pappus not plumose 134 ONOPORDON
 Achenes obliquely attached by one side; marginal flowers usually neutral, with enlarged oblique corollas. 135 CENTAUREA

1. *VERNONIA* Schreb. IRON-WEED.

Coarse erect perennial herbs, with alternate leaves and corymbose-paniculate, purple or rose-colored, or rarely white flowers. Involucre hemispherical to oblong-cylindric or turbinate; its bracts imbricate in several or many series, dry or partly herbaceous. Receptacle flat, naked. Ray-flowers none. Corollas regular, 5-cleft, with narrow lobes. Anthers sagittate at the base, but not caudate. Achenes 8-10-ribbed, truncate at the apex, callous at the base. Pappus in two series in our species, the outer of small squanellae or short stout bristles, the inner of capillary scabrous bristles.

- Leaves ovate-lanceolate, pinnately veined, bracts obtuse or acute 1 *V. corymbosa*
 Leaves linear or lance-linear, lateral veins indistinct, bracts short-acuminate 2 *V. marginata*

1. *V. corymbosa* Schwein. Stem glabrous, usually red, 4-8 dm. high; leaves sessile, ovate-lanceolate, 4-7 cm. long, acute, regularly serrate, scabrous above, glabrous and pitted beneath; heads corymbose, 8-12 mm. high, about 21-flowered; involucre campanulate or hemispheric; bracts purple, appressed; achenes glabrous or nearly so. *V. fasciculata* Coult., not Michx. Valleys: Man.—Neb.—N.D. Plain. Au.

2. *V. marginata* (Torr.) Raf. Stem glabrous or nearly so, 4-8 dm. high; leaves linear or lance-linear, 5-15 cm. long, entire or minutely serrulate, punctate on both sides, puberulent above, heads in a flat-topped corymb, about 1 cm. high; bracts purple, ovate or lance-ovate; achenes glabrous. *V. Jamessii* T. & G. Plains: Neb.—Okla.—Tex.—Colo. Plain. Au.

2. *HOFMEISTERIA* Walp.

Low suffrutescent plants, with incised leaves and long-peduncled heads with white flowers. Involucre campanulate or hemispherical, its bracts imbricate in several series, striate-nerved. Receptacle naked. Ray-flowers none. Corollas of disk-flowers regular, 5-cleft. Anthers not caudate at the base. Style-branches clavate, stigmatose only at the base. Achenes 5-angled, not caudate, but with

a strong basal callus. Pappus double, the inner of 2-12 slender or capillary bristles equalling the slender corolla, the outer of alternating short thin paleae.

1. *H. pluriseta* A. Gray. Shrub 3-5 dm. high, with white bark; leaves long-petioled; blades lanceolate, deltoid or hastate, 5-10 mm. long, dentate or entire; heads about 20-flowered, 8-10 mm. high; bracts with spreading tips, glandular-puberulent, the outer herbaceous, the inner chartaceous; pappus of 10-12 bristles and as many narrow acute chaff. Arid regions: s Calif.—Nev.—s Utah—Ariz. *L. Son.* Ap—My.

3. **EUPATORIUM** L. JOE-PYE WEED, THOROUGHWORT, BONESET,
WHITE SNAKE-ROOT.

Ours erect branching perennial herbs, with opposite or verticillate, often punctate leaves, cymose-paniculate heads, and white to purple flowers. Involucre oblong to hemispheric, its bracts imbricate in 2-several series. Receptacle from flat to conic, naked. Ray-flowers none. Corolla of the disk-flowers regular, with slender tube and 5-lobed limb. Anthers obtuse at the base, apiculate at the tip. Style-branches elongate, flattened, or thickened above, stigmatic at the base. Achenes 5-angled, truncate at the apex. Pappus simple, of numerous capillary scabrous bristles.

Leaves verticillate in whorls of 3's; flowers pink or rose-colored

Leaf-blades lanceolate, acuminate, strongly reticulate and rugose. 1 *E. Bruneri*.

Leaf-blades broadly ovate, acute, neither strongly reticulate nor rugose

2 *E. maculatum*.

Leaves opposite, flowers white or slightly tinged with pink

Achenes hispidulous on the angles

Bracts unequal in length, distinctly ribbed only towards the base

3. *E. texense*.

Bracts essentially equal in length, strongly ribbed to near the apex

4 *E. arizonicum*.

Achenes merely glandular-puberulent or glabrate

5 *E. occidentale*

1. *E. Bruneri* A. Gray. Stem more or less canescent, 5-15 dm. high; leaf-blades serrate, scabrous above, velutinous beneath, 10-15 cm. long; bracts more or less purplish, the outer ovate, pubescent, the inner linear-oblong, glabrous, all rounded or obtuse at the apex; heads nearly 1 cm. high. *E. atromontanum* A. Nels. *E. Rydbergii* Britton. Moist soil: Sask.—Ia.—Colo.—Utah—B.C. *Plain*—*Submont.* Jl—S.

2. *E. maculatum* L. Stem scabrous or pubescent, at least above, 5-20 dm. high, striate, often spotted with purple; leaves ovate or the upper ovate-lanceolate, acute, coarsely serrate, puberulent beneath and often pubescent on the veins above; bracts purplish, the outer ovate, rounded at the apex, the inner linear-oblong, acutish; heads about 1 cm. high. Moist soil: N.Y.—Ky.—N.M.—Sask. *Plain.* Au—S.

3. *E. texense* (T. & G.) Rydb. Shrubby at the base; stem 5-10 dm. high, puberulent; leaf-blades ovate, deltoid or cordate, coarsely dentate, triple-nerved, more or less scabrous on both sides, 2-5 cm. long; inflorescence corymbiform-paniculate, heads 8 mm. high; bracts in about 2 series, only slightly imbricate, lanceolate, acute, puberulent; flowers about 12. Rocky hills: Tex.—Colo.—Ariz. *Son.*—*Submont.* Jl—S.

4. *E. arizonicum* (A. Gray) Greene. Stems 3-7 dm. high, from a woody caudex, yellowish green, finely puberulent; leaf-blades ovate or cordate, 2-5 cm. long, dentate, with small obtuse teeth, triple-nerved, minutely scabrous; inflorescence paniculate; heads about 7 mm. high; bracts in 2 series, practically equal in length, scabrous-puberulent, lanceolate. *E. occidentale arizonicum* A. Gray. Cañons s Utah—N.M.—s Calif. *L. Son.* Au—O.

5. *E. occidentale* Hook. Stems 2-5 dm. high, finely puberulent or glabrate; leaf-blades ovate, rounded or truncate at the base, 2-5 cm. long, triple-nerved, minutely scabrous-puberulent, more or less dentate; heads paniculate, 7-8 mm. high; bracts in two series, equal, puberulent, faintly ribbed. Rocky places: Wash.—Ida.—n Utah—Calif. *Son.* Jl—S.

heads subsessile, 2-5 together; disk- and ray-flowers each about 4. Dry plains: Wyo.—Colo. *Submont.* S-O.

4. *G. diversifolia* Greene. Stems 1-2 dm. high, angled, scabrous; lower leaves often oblanceolate, the rest linear, 2-4 cm. long, about 2 mm. wide, scabrous; inflorescence corymbiform; heads subsessile, clustered; bracts oblong, with thick, obtuse or acutish tips; ray-flowers 5 or 6, disk-flowers 8-10. (?) *G. viridifolia* Greene. Plains: Sask.—N.M.—Utah—Alta. *Submont.* JI-S.

5. *G. filifolia* Greene. Stems 3-6 dm. high, puberulent; leaves 1-4 cm. long, scabrous-puberulent; involucre obovoid-turbinate, 3-4 mm. long; outer bracts ovate, acute, green-tipped, the inner obtuse, apiculate, scarcely at all green; ligules about 3 mm. long; ray- and disk-flowers each 3 or 4. Dry plains: Ida.—N.M.—Ariz.—Nev. *Plain—Submont.* Au-O.

6. *G. divaricata* (Nutt.) T. & G. Stem 2-4 dm. high, branched, glabrous or nearly so; leaves 1-2 cm. long, about 0.5 mm. wide, glabrous, spreading; involucre turbinate obconic, 4-5 mm. high; bracts lanceolate, acute, green-tipped; ray-flowers 5 or 6; ligules 2 mm. long; disk-flowers 5-8. Plains: Wyo.—Tex.—Utah. *Plain—Submont.* Au-S.

7. *G. juncea* Greene. Stems 1-2 dm. high; leaves 0.5 mm. wide, puberulent, spreading, early deciduous; inflorescence corymbiform; involucre turbinate, 3 mm. long; bracts ovate, acute, green-tipped except the innermost; ray- and disk-flowers each 4 or 5. Dry hills and plains: Okla.—Colo.—Ariz.—Tex. *Plain—Mont.* JI-Au.

8. *G. Sarothrae* (Pursh) Britt. & Rusby. Stems 1-3 dm. high; leaves puberulent; heads numerous in flat-topped cymes; involucre turbinate, 4 mm. high; bracts oblong, acute, slightly green-tipped; ray-flowers 3-5; ligules 1.5-2 mm. long; disk-flowers 2-5. *G. Euthamiae* T. & G. *G. myriacephala* A. Nels. Dry plains: Sask.—Kans.—Utah—Alta. *Plain—Submont.* JI-S.

9. *G. longifolia* Greene. Shrub 5-10 dm. high; young branches scabrous-puberulent or nearly glabrous; leaves linear, 3-6 cm. long, 1-2 mm. wide, slightly scabrous; inflorescence ample, flat-topped; heads subsessile, often 2 or 3 together; involucre 4-6 mm. high; bracts with thick green obtuse or acutish tips; ray- and disk-flowers each 4 or 5. Dry hills and plains: Colo.—Utah—N.M.—Tex. *Plain—Submont.* Au.

10. *G. linearis* Rydb. Shrubby and branched, 3-6 dm. high; leaves linear, about 3 cm. long, 1-2 mm. wide, puberulent and viscid, punctate; heads 5-6 mm. high; bracts scarious-margined; inflorescence corymbiform; heads subsessile, 2 or 3 together; ray- and disk-flowers each 3-4. Plains: Neb.—Kans.—N.M.—Colo. *Plain—Submont.* JI-S.

11. *G. glomerella* Greene. Suffrutescent, fastigiately branched, 4-6 dm. high; branches of the season striate, glabrous; leaves linear-filiform, 2-4 cm. long, about 1 mm. wide, scabrous-puberulent; inflorescence corymbiform; heads sessile, 2-5 together; involucre oblong, 2 mm. high; bracts glutinous, oblong, obtuse. Dry plains: Tex.—Colo.—Ariz. *Plain—Son.* Au-S.

8. AMPHIPAPPUS T. & G.

Shrubs with glabrous foliage. Leaves alternate, small, entire. Heads numerous, conglomerate in small clusters forming a corymb, radiate; involucre campanulate, few-flowered; bracts leathery, imbricate in few series. Ray-flowers 1 or 2, short, pistillate and fertile. Disk-flowers hermaphrodite, but sterile, with rudimentary glabrous ovaries. Achenes of the ray-flowers pubescent; pappus of few and short bristles or scales, united at the base. Pappus of the disk-flowers of about 20 flattish denticulate-hispidulous tortuose bristles, some of them branching or irregularly paleaceous-concreted at the base.

1. *A. Fremontii* T. & G. A shrub 3-6 dm. high with rigid white branches; leaves obovate or spatulate, about 1 cm. long; heads sessile and glomerate; involucre campanulate, 4 mm. high; bracts 7-9, thin, oval, without green tips; ray-flowers 1 or 2, short; disk-flowers 3-6. *Amphiachyris Fremontii* A. Gray. Desert regions: s Calif.—Nev.—s Utah. *L. Son.*

9. **GRINDELLIA** Willd. GUM-PLANT, RESIN-WEED.

Coarse biennial or perennial herbs (some western species even shrubby), usually with glabrous and glutinous foliage. Leaves alternate, usually spinulose-toothed. Heads relatively large, radiate or rarely discoid, often corymbose, many-flowered. Involucres hemispheric or depressed; bracts imbricate, usually with subulate spreading or recurved tips and mostly gummy; receptacle pitted. Ray-flowers pistillate, fertile, with yellow ligules, or rarely wanting. Disk-flowers hermaphrodite, usually fertile; corolla yellow. Stigmas narrow, flattened, with linear or lanceolate appendages. Achenes 4-5-ribbed, sometimes flattened; pappus of 2-8 awns or bristles, early deciduous.

Involucres not viscid

1. *G. platylepis*.

Involucres more or less viscid.

Leaves all entire, the basal ones 3-4 dm. long; bracts narrowly linear-lanceolate, the outer nearly filiform, rather thin.

2. *G. oregana*.

Leaves, at least the basal ones, more or less dentate, the latter less than 2 dm. long; bracts lanceolate, with thick, rather fleshy tips.

Heads radiate.

Pappus-awns apparently smooth; barbules seen only under a compound microscope.

Tips of the outer bracts spreading, none reflexed.

Stem-leaves serrate.

3. *G. decumbens*

Stem-leaves laciniate.

4. *G. laciniosa*.

Tips of the bracts squarrose, those of the outer ones strongly reflexed

Stem-leaves oval, ovate, or ovate-oblong with a broad base.

Leaves bluish green, spinulose-dentate; heads very broad and flat, its bracts broad and even the squarrose tips flattened.

5. *G. texana*.

Leaves yellowish green, merely dentate, heads hemispherical, its bracts narrow and with terete squarrose tips.

6. *G. squarrosa*.

Stem-leaves oblanceolate, rarely oblong.

Pappus-awns scarcely longer than the achenes, curved and twisted.

Squarrose tips of the bracts short, leaves subentire.

7. *G. integerrima*.

Squarrose tips of the bracts long and slender; leaves serrate, with spreading teeth.

8. *G. Brownii*.

Pappus-awns decidedly longer than the achenes, straight.

Leaves all finely serrate, dentate or subentire

Leaves finely and closely serrate

9. *G. serrulata*.

Leaves rather remotely dentate or subentire.

10. *G. perennis*.

Leaves coarsely toothed, the basal ones sublaciniate.

11. *G. subincisa*.

Pappus-bristles distinctly barbellate; barbules distinctly seen with a common pocket-lens.

Stems tall, 4-8 dm. high, usually solitary; stem-leaves broadly oblong or obovate, bracts broad, only the outer ones squarrose-reflexed

12. *G. erecta*.

Stems low, about 3 dm. high, usually several from the base; stem-leaves oblanceolate or oblong; all bracts squarrose

13. *G. subalpina*.

Heads discoid.

Stem-leaves oval or obovate.

14. *G. inornata*.

Stem-leaves oblanceolate or oblong

Outer bracts strongly recurved, the inner not squarrose

15. *G. fastigiata*.

All bracts squarrose.

Bracts long and loose, but not strongly recurved.

16. *G. aphanactis*.

Bracts short, strongly recurved-curved.

17. *G. columbiana*.

1. *G. platylepis* Greene. Perennial; stem about 5 dm. high, glabrous; leaves oblanceolate or oblong; involucres hemispheric, subtended by one or two leafy bracts; bracts oblong, abruptly herbaceous-tipped, not viscid; ligules broad, oblong, obtuse; pappus-bristles subulate, barbulate. Hills: Wyo. *Submont.*

2. *G. oregana* A. Gray. Perennial; stem 3-10 dm. high, sparingly puberulent or glabrous; basal leaves narrowly oblanceolate, entire or slightly denticulate, 1-2 dm. long, glabrous; stem-leaves lanceolate, oblong or oblanceolate; involucre about 15 mm. high and 15-20 mm. broad; ligules numerous, 15-20 mm. long; pappus-bristles 3-4 mm., smooth, curved. Dry grounds: B.C.—Ida.—Ore. *Submont.* Jl—Au.

3. *G. decumbens* Greene. Perennial, with a caespitose caudex; stem 2-5 dm. high, more or less decumbent at the base; basal leaves oblanceolate, obtuse, serrate towards the summit; stem-leaves oblong, acute, entire or denticulate;

involucres 8 mm. high, 10-12 mm. broad; bracts subulate; ligules 8 mm. long; pappus-bristles straight, 4 mm. long, barbellate above. Plains: Kans.—Colo.—N.M. *Plain—Submont.* JI-Au.

4. *G. laciniata* Rydb. Low perennial; stems slender, several, 3-5 dm. high; lower leaves narrowly linear-ob lanceolate, 1 cm. long, 3-5 mm. wide, sparingly dentate; stem-leaves irregularly pinnately lobed or lacinate, with narrow lanceolate divisions; involucre hemispheric, 10-12 mm. broad; bracts lanceolate, with short subulate spreading tips; ligules 5-8 mm. long, numerous; pappus-bristles curved, 3 mm. long. Mts: sc Utah. *Son.—Submont.* JI-Au.

5. *G. texana* Scheele. Perennial; stem stout, 4-10 dm. high, glabrous or nearly so, straw-colored; basal leaves oblanceolate; stem-leaves obovate or oval, 3-8 cm. long; involucre 1 cm. high, 2 cm. wide; ligules 12-15 mm. long; pappus-bristles straight, slender, 5 mm. long. *G. squarrosa grandiflora* A. Gray, in part. Plains: Colo.—Tex.—N.M. *Plain—Submont.* Au-O.

6. *G. squarrosa* (Pursh) Dunal. Biennial or perennial; stem 3-6 dm. high, corymbosely branched; basal leaves oblanceolate; stem-leaves oval, oblong-ovate, or ovate, broad at the base; involucres 8-10 mm. high, 15-20 mm. broad; ligules 8-10 mm. long. Prairies and plains: Sask.—Ia.—Kans.—Ariz.—Ida. *Plain—Submont.* Au-S.

7. *G. integerrima* Rydb. Perennial, with a caespitose base; stems about 3 dm. high, glabrous, somewhat angled; leaves narrowly oblanceolate, 2-4 cm. long, acute, strongly resinous-dotted; heads numerous, corymbose; involucre about 7 mm. high and 1 cm. wide; ligules 6-7 mm. long. Sandy soil: Ida. JI.

8. *G. Brownii* Heller. Perennial, with a caespitose caudex; stems 3-6 dm. high, red or purplish, glabrous; leaves spatulate or oblanceolate, acute, 3-5 cm. long; involucres 8 mm. high, 10-12 mm. broad; ligules 6 mm. long. Plains: Ida. Ore. *Plain.* JI-S.

9. *G. serrulata* Rydb. Biennial or perhaps short-lived perennial; stem glabrous, about 6 dm. high; leaves sessile, oblanceolate or oblong, acutish, very viscid, 3-5 cm. long; involucre very viscid, about 15 mm. broad; ligules 7-8 mm. long, 1-1.5 mm. wide. Plains and hills: N.M.—Wyo.—Utah. *Plain—Submont.* JI-S.

10. *G. perennis* A. Nels. Perennial, sometimes caespitose at the base; stem paniculately branched, 3-5 dm. high, glabrous; leaves entire or remotely dentate, oblanceolate, 4-7 cm. long, the upper sessile and clasping; involucres nearly 1 cm. high, 12-20 mm. broad; ligules 8-10 mm. long. Plains and hills: Sask.—Colo.—Ida.—Alta. *Submont.* JI-S.

11. *G. subincisa* Greene. Perennial, with caespitose base; stems decumbent below, glabrous; basal leaves narrowly oblanceolate, 8-12 cm. long, glabrous or nearly so, pinnately cleft or incised; stem-leaves oblong-lanceolate, sessile, coarsely toothed; heads few; involucres about 1 cm. high and 2 cm. broad; ligules 8-10 mm. long. Hills: Colo.—N.M.—Ariz. *Submont.* JI-S.

12. *G. erecta* A. Nels. Biennial; stem glabrous throughout; leaves ample, serrate, the lower oblanceolate, 6-10 cm. long; heads many; involucres about 1 cm. high and 1.5 cm. wide; bracts lanceolate, only the outer with squarrose, terete tips; ligules 14-18 mm. long. Mountains: Wyo.—Colo. *Submont.—Mont.* Au-S.

13. *G. subalpina* Greene. Low perennial; stem 2-4 dm. high; basal leaves oblanceolate, coarsely and remotely toothed, scabrous-puberulent; involucres 8 mm. high, 12-15 mm. wide; rays many, 8-10 mm. long. (?) *G. Eldorae* Daniels. Mountains: Mont.—N.M.—Utah—B.C. *Submont.—Mont.* JI-S.

14. *G. inornata* Greene. Perennial; stems several from the woody root, low and stout; basal leaves oblanceolate, short-petioled, all saliently toothed all around; involucres hemispheric, large; bracts all squarrose; pappus-bristles barbellate below the very acute apex. Cañons: Colo.

15. *G. fastigiata* Greene. Perennial, sometimes suffruticose; stem 6-10 dm. high, glabrous; basal leaves oblanceolate, acute, remotely serrate; stem-

leaves similar, but sometimes entire; heads small, rayless; involucre nearly 1 cm. high and broad; pappus-bristles barbellate. Hills: w Colo.—N.M.—Utah. Son. Au-S.

16. *G. aphanactis* Rydb. Apparently perennial; stem 3-4 dm. high, glabrous and striate; leaves very viscid, oblanceolate, acute, 4-7 cm. long, sharply dentate and sessile, or the lower more or less pinnatifid and petioled; heads about 15 mm. broad; bracts very viscid, subulate; awns of the pappus apparently smooth. Sandy soil: sw Colo.—se Utah—N.M. Son. Jl.

17. *G. columbiana* (Piper) Rydb. Perennial, caespitose at the base; stems about 3 dm. high, glabrous; leaves oblanceolate, denticulate, 3-6 cm. long; heads numerous, rayless; involucre 8-10 mm. high, 10-15 mm. broad; pappus-bristles curved and twisted. *G. discoidea* Nutt., not H. & A. Sandy places: Wash.—Ida.—Ore. Son. Au.

10 VANCLÈVEA Greene.

Low tufted desert shrubs, with white shreddy bark and entire leaves. Heads discoid. Involucre turbinate; bracts squarrose, acuminate, very gummy. Disk-flowers hermaphrodite and fertile; corollas yellow, club-shaped, with 5 erect teeth. Style elongate; branches long, sub-terete, papillose-puberulent. Achenes prismatic, villous-hirsute. Pappus of about 12 narrowly linear acute squamellae, ciliate on the margins, persistent.

1. *V. stylosa* (Eastw.) Greene. Stems 6-10 dm. high, bushy; leaves 3-nerved, linear-lanceolate, acuminate, 2-3 cm. long, 2-3 mm. wide, vertical by a twist at the base; heads corymbose, 15 mm. high, 10 mm. wide; pappus-scales 3 mm. long, one-third mm. broad. *Grindelia stylosa* Eastw. Sandy wastes: t. Son. Jl.

11. ACAMPTOPAPPUS A. Gray.

Low shrubs, glabrous or obscurely puberulent, neither glandular nor resinous. Leaves small, linear, entire, without lateral veins. Heads terminal at the ends of the branches, discoid or radiate; involucre globose; bracts closely imbricate in 3 series, rounded-oval to oblong, scarious-margined, erose-fimbriate. Disk-corollas yellow, funnelform; style-branches with thickish subulate appendages. Achenes round-turbinate, densely long-villous. Pappus equalling the corollas, of 15-18 flattened, rigid awns, slightly dilated at the end, and as many shorter setiform awns or bristles.

1. *A. sphaerocephalus* (Harv. & Gray) A. Gray. Shrub 3-10 dm. high, with white striate bark; leaves oblanceolate, sessile, about 1 cm. long, minutely puberulent; heads discoid, depressed-globose, 8-10 mm. high; bracts straw-colored, with pale green spots, with scarious erose margins. Desert regions: Ariz.—s Utah—Calif. L. Son. My-Je.

12. CHRYSÓPSIS Nutt. GOLDEN ASTER.

Biennial or perennial (ours perennial with a caespitose caudex), caulescent herbs, usually conspicuously pubescent. Leaves alternate. Heads showy, golden yellow, radiate, or rarely discoid, mostly corymbose, many-flowered; bracts narrow, in several series, more or less imbricate; receptacle pitted. Ray-flowers many, pistillate. Disk-flowers hermaphrodite and fertile. Stigmas with linear or subulate appendages. Achenes flattened. Pappus double, the outer series of small scales or bristles, the inner of numerous scabrous bristles.

Heads radiate.

Involucre strigose.

Heads sessile or subsessile, subtended by foliage-leaves.

Leaves narrowly linear-oblanceolate, hirsute.

Leaves oblanceolate, obovate, elliptic, or lanceolate, strigose at least when young, except in *C. imbricata*.

Plant about 1 dm. high or less; heads usually solitary.

Involucre 5-8 mm. broad; leaves less than 1 cm. long.

Involucre 10-12 mm. broad; leaves 2-3 cm. long.

Plant 2-6 dm. high; heads corymbose.

1. *C. angustifolia*.

2. *C. caespitosa*.

3. *C. alpica*.

- Leaves oblong or lanceolate, decidedly acute, those subtending the heads narrowly linear. 4. *C. foliosa*.
- Leaves oblanceolate or obovate, those of the inflorescence elliptic or oval
- Disk of the heads about 15 mm. broad; leaves strigose.
- Inner bracts with subulate, usually brownish and spreading tips. 5. *C. caudata*.
- Inner bracts merely acute. 6. *C. amplifolia*
- Disk of the heads 10-12 mm. broad, leaves hirsutulous. 7. *C. imbricata*
- Heads peduncled, naked or rarely subtended by one small leaf.
- Plant less than 1 dm. high; heads solitary at the ends of the branches. 8. *C. depressa*.
- Plant 2-3 dm. high; heads more or less corymbose. 9. *C. pedunculata*
- Heads long-peduncled, peduncles 2-7 cm. long.
- Heads short-peduncled.
- Plant finely silvery-canescens, scarcely at all hirsute 10. *C. mollis*.
- Plant usually grayish-green, conspicuously hirsute on the stem, leaves hirsute-ciliate towards the base.
- Most of the leaves sessile.
- Leaves oblanceolate or obovate, obtuse or merely apiculate; disk of the heads 15-20 mm. broad 11. *C. villosa*.
- Leaves narrowly oblanceolate, decidedly acute; disk 10-12 mm. broad. 12. *C. hirsutissima*.
- Most of the leaves distinctly petioled, disk 10-12 mm. broad
- Involucre more than 1 cm. high and broad, leaves oblanceolate 13. *C. Bakeri*.
- Involucre scarcely 1 cm. high and broad; leaves linear-oblanceolate. 14. *C. floribunda*
- Involucre hirsute or both hirsute and resinous-granuliferous.
- Leaves lanceolate, acute or acuminate, sessile; plant densely hirsute with long white hairs 15. *C. barbata*
- Leaves oblanceolate, oblong, obovate or oval; plant not conspicuously long-hairy.
- Involucre densely hirsute, scarcely at all resinous-granuliferous.
- Leaves short, 1-2 cm. long, obovate, nearly all sessile 16. *C. Butleri*
- Leaves oblanceolate, the lower petioled
- Plant 1-2 dm. high, heads usually solitary and sessile. 17. *C. pumila*.
- Plant 2-3 dm. high; heads peduncled and corymbose
- Disk of the heads 8-10 mm. broad, leaves densely hirsute, not resinous, only the lower petioled 18. *C. columbiana*
- Disk of the heads 12-18 mm. wide, leaves distinctly resinous-granuliferous, nearly all petioled. 19. *C. grandis*.
- Involucre sparingly hirsute, copiously resinous-granuliferous.
- Upper leaves obovate, oval, only rarely oblong or broadly oblanceolate, sessile.
- Heads sessile, subtended by oblong or obovate leaves.
- Leaves numerous, ascending, 3-5 cm. long, involucre about 1 cm. high. 20. *C. resinolens*
- Leaves scattered, spreading, 1-2 cm. long; involucre 8-9 mm. high 21. *C. fulcrata*
- Heads peduncled, naked or subtended by small linear leaves.
- Leaves densely hispid, not conspicuously granuliferous. 22. *C. horrida*
- Leaves conspicuously granuliferous, only sparingly hispidulous. 23. *C. viscida*
- Upper leaves as well as the lower oblanceolate, most of them petioled.
- Leaves broadly oblanceolate, heads peduncled
- Leaves decidedly hairy, sparingly granuliferous. 24. *C. asprella*.
- Stem simple to near the top. 14. *C. floribunda*
- Stem profusely branched.
- Leaves sparingly hairy, conspicuously granuliferous. 25. *C. hispida*
- Leaves narrowly linear-oblanceolate; heads subsessile. 26. *C. stenophylla*
- Heads discoid; leaves lanceolate, hispid-ciliate, otherwise glabrous, minutely granuliferous. 27. *C. oregana*.

1. *C. angustifolia* Rydb. Stems erect, 2-4 dm. high, canescent and more or less hirsute; leaves 2-5 cm. long, 2-5 mm. wide, acute, grayish-strigose, hispid-ciliate; involucre turbinate-campanulate, 8-10 mm. high; bracts narrow and linear, acute; ligules about 1 cm. long. *C. stenophylla* Britt. & Brown, not Greene. Sandy places: Alta.—Kans. Plain. Au-S.

2. *C. caespitosa* M. E. Jones. Cespitose from a woody root, forming a mat; stems spreading, 5-8 cm. long, villous-hirsute; leaves spatulate, villous-canescens, apiculate; heads sessile; involucre 6 mm. high; bracts ashy-strigose,

the inner with purplish margins; ligules golden yellow, 5-6 mm. long, 1-1.5 mm. wide. Hills: s Utah. *Son.* My.

3. *C. alpicola* Rydb. Stems silky-villous, numerous; leaves oblanceolate, about 3 cm. long, nearly all petioled, white-silky, strigose or the pubescence more spreading on the petioles; bracts linear-lanceolate, strigose or silky, acute; ligules about 8 mm. long and 2 mm. wide. *C. Cooperi* A. Nels. *C. pumila* Coult. & Nels., not Greene. High peaks: Colo.—Wyo. *Subalp.*—*Alp.* JI-Au.

4. *C. foliosa* Nutt. Stem 3-6 dm. high, very leafy, canescent, strigose and hirsute; lower leaves oblanceolate, acute, 3-5 cm. long, white silky-strigose on both sides, subsessile; heads subtended by linear bract-like leaves, about 1 cm. high; bracts linear, acute, strigose. Sandy soil: Minn.—Kans.—Utah—Wash. *Plain*—*Submont.* JI-Au.

5. *C. caudata* Rydb. Stems many, erect, hirsute with long white hairs; lower leaves oblanceolate, silky-strigose on both sides, 3-5 cm. long; heads congested in small clusters at the end of the branches; bracts linear-lanceolate, hirsute-strigose; ligules bright yellow, about 12 mm. long. Hills and mountains: Colo. *Submont.*—*Mont.* JI-Au.

6. *C. amplifolia* Rydb. Stem 3-5 dm. high, often branched, pubescent and sparingly hirsute; lower leaves spatulate, strigose, obtuse or slightly mucronate, the uppermost cordate or truncate at the base, 3-4 cm. long, 12-15 mm. wide; inflorescence corymbiform; bracts hirsute-strigose, linear-lanceolate, acute; ligules about 12 mm. long. Mountains: Colo.—Wyo. *Submont.* JI-Au.

7. *C. imbricata* A. Nels. Stems 3-4 dm. high, subcanescent and with some long hairs; leaves numerous, the lower oblanceolate or spatulate, petioled, the upper broadly oblong or oblong-oblanceolate, sessile and mostly obtuse or apiculate, grayish hirsutulous; involucre 8-10 mm. high; bracts lance-linear, hirsute-strigose. Mountains: Colo.—Utah—*Mont.* *Submont.* JI.

8. *C. depressa* Rydb. Stems intricately branched; leaves seldom over 1 cm. long, obovate or spatulate, the lower short-petioled, the upper sessile, densely silky-strigose canescent; involucre about 7 mm. high and 1 cm. broad; bracts linear, acute, puberulent-strigose. Geyser formations: Mont.—Wyo. *Mont.* Au.

9. *C. pedunculata* Greene. Stems short, decumbent, about 2 dm. high, strigose-canescens; leaves oblanceolate, silvery canescent, 2-3 cm. long; heads solitary, on peduncles 2-8 cm. long; involucre 8 mm. high, 1-1.5 cm. broad; bracts linear, acute, strigose-canescens. Dry hillsides: Colo. *Submont.* JI.

10. *C. mollis* Nutt. Stems decumbent to erect, 2-4 dm. high, finely strigose-canescens; leaves spatulate or oblanceolate, obtuse or apiculate, or the upper oblong and more acutish, 2-4 cm. long; heads corymbose, peduncled; involucre about 8 mm. high and as wide; bracts linear, acute. Sandy places: Wash.—Utah—Wyo.—*Mont.* JI-Au.

11. *C. villosa* (Pursh.) Nutt. Stem 2-5 dm. high, strigose and more or less hirsute; leaves 2-4 cm. long, obovate, elliptic or oblong, appressed silky, hirsute-ciliate, usually sessile; heads peduncled, sometimes subtended by a small leaf; involucre about 1 cm. high. Dry hills: Sask.—Minn.—Tex.—N.M.—Ida. *Plain*—*Mont.* JI-S.

12. *C. hirsutissima* Greene. Stem 1-3 dm. high, densely long-hirsute as well as hirsutulous; leaves oblanceolate, somewhat spreading, the lower short-petioled, the upper sessile, densely grayish-strigose; heads fastigiate-corymbose; involucre 8 mm. high. Sandy soil: Sask.—N.D.—N.M.—Ariz. *Plain*—*Submont.* Je-Au.

13. *C. Bakeri* Greene. Stems 2-4 dm. high, often purplish, strigose and only sparingly hirsute; leaves mostly acute, strigose, only slightly resinous-granuliferous, heads few, peduncled; involucre about 8 mm. high; bracts often purplish-margined. Hills: Wyo.—Ida.—N.M.—Utah. *Submont.*—*Mont.* JI-Au.

14. *C. floribunda* Greene. Stem about 3 dm. high, sparingly strigose and with a few long spreading hairs; heads paniculate, small; involucre 7-8 mm.

- Bracts strongly carinate and with conspicuous green tips.
 Bracts acute; upper leaves not much reduced. 30. *C. elegans*.
 Bracts obtuse; upper leaves much reduced. 42. *C. turbinatus*.
 Leaves linear to lance-linear or oblanceolate, 2-8 mm. wide.
 Bracts linear, oblong, or lanceolate
 Bracts at least the outer ones with thick green tips 31. *C. linifolius*.
 Bracts comparatively thin, not green-tipped.
 Bracts linear-lanceolate, very acute. 32. *C. stenolepis*.
 Bracts oblong or lanceolate, the inner obtuse.
 Involucre not viscid; leaves hispidulous ciliate-dentate. 33. *C. glaucus*.
 Inflorescence densely viscid; leaves minutely denticulate. 34. *C. viscidiflorus*.
 Bracts ovate, oval, or the inner broadly elliptic, abruptly short-cuspidate. 35. *C. latifolius*.
 Leaves and stems decidedly puberulent. 36. *C. lanceolatus*.
 Leaves 3-6 mm. wide, rarely twisted.
 Leaves 1-2.5 mm. wide, usually twisted.
 Leaves 3-nerved; inner bracts linear, acute; branches green or yellowish. 37. *C. puberulus*.
 Leaves 1-nerved, thick; inner bracts spatulate-oblong, rounded at the apex; branches white. 38. *C. marianus*.
 Achenes glabrous
 Bracts acutish; leaves filiform. 9. *C. filifolius*.
 Bracts rounded at the apex; leaves linear.
 Branches white-tomentose when young; corolla 7-10 mm. long.
 Leaves linear, more or less involute; corolla-lobes deltoid-lanceolate. 39. *C. leiospermus*.
 Leaves linear-oblanceolate, not involute; corolla-lobes linear-lanceolate. 40. *C. glareosus*.
 Branches not tomentose; corolla 5-6 mm. long.
 Plant glabrous
 Leaves linear-oblanceolate. 41. *C. vaseyi*.
 Leaves filiform, the upper much reduced. 42. *C. turbinatus*.
 Plant decidedly puberulent; leaves narrowly linear. 38. *C. marianus*.

1. *C. depressus* Nutt. Undershrub, suffrutescent at the base; stem 1-2 dm. high; leaves short, 0.5-1 cm. long, thick; inflorescence short and corymbiform; heads few, about 1 cm. high; bracts 5-ranked in 4-5 series, puberulent, lanceolate, gradually cuspidate. *Bigelovia depressa* A. Gray. Plains: Utah—Colo.—N.M. Plain—Submont. JI-S.

2. *C. Bigelovii* (A. Gray) Greene. A shrub, 3-10 dm. high; branches white-tomentose at first, soon glabrate; leaves linear-filiform, 1-3 cm. long, white-tomentulose when young, soon glabrate; involucre 10-12 mm. high; bracts thin, lanceolate, tomentulose and arachnoid-ciliate, 5-ranked in 4 or 5 series. *B. Bigelovii* A. Gray. Dry plains: Colo.—Tex.—e Ariz.—Utah. Son.—Submont. Au-O.

3. *C. pulchellus* (A. Gray) Greene. A shrub 6-10 dm. high; branches glabrous, striate; leaves narrowly linear, 1-2 cm. long, glabrous or ciliolate on the margins; involucre 10-15 mm. high; bracts 5-ranked in 5-6 series, lanceolate; achenes sparingly pubescent or glabrous. *B. pulchella* A. Gray. Dry hills: Kans.—Tex.—N.M.—Utah; n Mex. Son.—Submont. Au-S.

4. *C. Parryi* (A. Gray) Greene. Suffrutescent perennial; branches erect, 3-5 dm. high, white-tomentulose when young; leaves 3-7 cm. long, minutely puberulent or glabrate; heads racemose-thyrsoïd; involucre about 1 cm. high; bracts linear-lanceolate, attenuate. *C. affinis* A. Nels. *B. Parryi* A. Gray. Hills and dry valleys: Wyo.—Colo. Submont.—Mont. Au-S.

5. *C. attenuatus* (M. E. Jones) Rydb. Low shrub, 1-3 dm. high; leaves 2-3 cm. long, erect, green; heads in small corymbs; involucre about 1 cm. long; bracts narrowly lanceolate, gradually long-attenuate, arachnoid-ciliate on the margins; corollas 10-12 mm. long. *B. Howardii attenuata* M. E. Jones. *C. affinis attenuatus* A. Nels. Mountains: Utah. Submont.—Mont. Au-O.

6. *C. Newberryi* Rydb. Shrubby below, 2-4 dm. high; leaves slightly tomentulose when young, 2-3 cm. long; bracts narrowly lanceolate, attenuate into a long slender subulate spreading tip, carinate, slightly tomentulose and

webby; corolla narrowly tubular-funnelform, about 15 mm. long. Hills: N.M.—Colo. *Son.*—*Submont.* Au-S.

7. **C. Howardii** (Parry) Greene. Low shrub, 1-3 dm. high; branches white-tomentose, ascending; leaves linear-filiform, 3-5 cm. long; involucre 10-12 mm. high; bracts lanceolate-attenuate, tomentose as well as arachnoid; flowers scarcely 1 cm. long. *B. Howardii* A. Gray. Dry hills: Neb.—Wyo.—Colo. *Plain*—*Submont.* Jl-S.

8. **C. Greenei** (A. Gray) Greene. Perennial, with a woody caudex and deep taproot; stems 1-3 dm. high, glabrous and shining, with a white bark; leaves narrowly linear, glabrous, scabrous on the margins, more or less twisted; cyme flat-topped; heads numerous, 6-8 mm. high; bracts chartaceous, lanceolate. *B. Greenei* A. Gray. *C. scoparius* Rydb. Plains: Colo.—N.M.—Utah. *Submont.* S-O.

9. **C. filifolius** Rydb. Small shrub, about 3 dm. high, very bushy; leaves very narrow, linear-filiform, glabrous except the minutely scabrous-ciliate margins; cyme large, flat-topped; heads very numerous, 5-6 mm. high, turbinate; bracts lanceolate-acuminate, the outer with green tips. Plains: Colo.—N.M. *Submont.*—*Mont.* Jl-Au.

10. **C. albidus** (M. E. Jones) Greene. Shrub, 3-8 dm. high; stem slightly tomentulose and viscid; leaves filiform, 2-4 cm. long, about 1 mm. wide, very numerous, slightly if at all tomentulose; heads fastigate-corymbose; involucre 8-10 mm. high; bracts coriaceous, lanceolate, the outer subulate-acuminate, the inner merely acute; corollas straw-colored; achenes hirsutulous. *B. alba* M. E. Jones. Arid regions: Utah—Nev—se Calif. *Son.* My-Au.

11. **C. collinus** Greene. Shrub, 2-4 dm. high, greenish, obscurely cinereous, tomentulose only when young; leaves linear-filiform, soon glabrate and gummy; heads few; bracts carinate, 3 or 4 in each series, the outer lanceolate, acuminate, the inner cuspidate-attenuate. *B. collina* A. Nels. Hills: Colo.—Wyo. *Submont.* Au.

12. **C. wyomingensis** A. Nels. Tufted shrub, 2-4 dm. high, bushy; branches yellowish green, slightly tomentulose when young; leaves narrowly linear, viscidulous; inflorescence thyrsoïd, leafy; bracts somewhat indistinctly 5-ranked, lanceolate gradually short-acuminate. Saline soil and dry plains: Colo.—Wyo. *Submont.* Jl-Au.

13. **C. formosus** Greene. Low shrub, branched from the base, about 3 dm. high; stem white-tomentose; leaves linear, spreading, white-tomentose; bracts 6 or 7 in each vertical rank, glabrous, the outer ovate, the inner longer, oblong-linear, obtuse or acutish. Hills: w Colo. *Son.* Au.

14. **C. virens** Greene. Shrub, 1-2 m. high; leaves 4-6 cm. long, linear; heads many in large corymb; involucre 6-7 mm. long; bracts in 4 series; teeth of the corolla obtusish, one-fourth as long as the throat, not spreading. Plains: se Colo. *Son.* S.

15. **C. graveolens** (Nutt.) Greene. Shrub, 1-1.5 m. high, green, pannose only when young; leaves linear, 4-7 cm. long; heads numerous in a compound corymb; involucre about 8 mm. long; bracts lanceolate, in 4 series; lobes of the corolla lanceolate, more than half as long as the throat, spreading. *B. graveolens glabrata* A. Gray. *C. falcatus* Greene. *C. laetevirens* Greene. Cañons, badlands, and dry hills: Neb.—N.M.—Utah—Mont. *Plain*—*Submont.* Au-O.

16. **C. patens** Rydb. Shrubby, half a meter or so high; leaves 6-8 cm. long, about 1 mm. broad; bracts lanceolate, acute, carinate, glabrous; corolla-lobes about 1 mm. long. Dry plains and hills: Colo. *Plain*—*Submont.* Je-Jl.

17. **C. pinifolius** Greene. Shrub, 3-5 dm. high; branches erect, yellowish green and soon glabrous, slightly resinous; leaves 4-5 cm. long, almost filiform; heads in small panicles; involucre about 8 mm. high; bracts in 3 series, narrowly lanceolate. Dry hills and plains: Colo.—N.M.—Nev.—Ore. *Son.*—*Submont.*

18. **C. concolor** (A. Nels.) Rydb. Shrub, 3-4 dm. high, woody at the base; branches yellowish green, pannose only when young; leaves linear, somewhat

spreading, 4-7 cm. long, 1-2 mm. wide, slightly pannose-tomentose; involucre 8-9 mm. long; bracts lanceolate, acutish, scarious-margined, erose, ciliate, the lower slightly tomentose. *C. frigidus concolor* A. Nels. Sandy alkaline soil: Wyo. *Submont.* S.

19. *C. oreophilus* A. Nels. Low shrub, 2-4 dm. high; branches grayish with a thin tomentum, yellowish green; leaves erect, linear-filiform, 3-5 cm. long; involucre 8 mm. long; bracts ovate-lanceolate or oblong-lanceolate, abruptly acute. Stony hills: Wyo.—Colo. *Submont.* JI-O.

20. *C. plattensis* Greene. Low undershrub, 2-3 dm. high; branches more or less pannose-tomentose; leaves linear-filiform, tomentose, 3-5 cm. long; bracts in about 3 series, lanceolate, acute, glabrous except the erose-ciliate margins; achenes hirsute-strigose. Plains and hills: Mont.—S.D.—Colo. *Plain—Submont.* JI-O.

21. *C. pulcherrimus* A. Nels. Shrub, 5-15 dm. high; branches yellowish, minutely lanate; leaves narrowly linear, 5-8 cm. long, 1-2 mm. wide, white-tomentose to nearly glabrate; bracts in 2 or 3 series; linear-lanceolate, ciliate on the margins; achenes softly strigose. Plains: Mont.—Colo.—Utah—Ida. *Plain.* Au-O.

22. *C. frigidus* Greene. Undershrub, 2-6 dm. high; branches white-tomentose; leaves narrowly linear, 3-5 cm. long, white-tomentose, rarely glabrate; bracts in 2 or 3 series, lanceolate, the outer acute, the inner obtuse. Plains: Sask.—Colo.—Utah—Alta. *Plain—Submont.* JI-S.

23. *C. pallidus* A. Nels. Small tufted shrub, 2-5 dm. high; branches with close felted tomentum; leaves ascending or spreading, densely tomentose, the lower 4-5 cm. long; heads thyrsoid-paniculate; bracts ovate-lanceolate, subacute, ciliate on the margins and tomentose on the back. Alkaline flats: n Colo.—Wyo. *Submont.* Au-S.

24. *C. speciosus* Nutt. Shrub, 1-2 m. high; branches yellow, sparingly tomentose; leaves numerous, 3-4 cm. long, about 1 mm. wide, white-tomentose; bracts in 3 or 4 series, tomentose, but not ciliate, lanceolate, acute; achenes strigose. *B. graveolens* A. Gray, mainly. Plains: Ore.—Ida.—Calif. *Son.* JI-S.

25. *C. nauseosus* (Pursh.) Britton. Shrub, 5-10 dm. high, permanently white-tomentose, almost cottony; leaves 3-6 cm. long, about 1 mm. wide, tomentose, often spreading; bracts lanceolate, acute, more or less tomentose, but not ciliate; achenes hirsute-strigose. *B. graveolens albicaulis* A. Gray. Hillsides: B.C.—Mont.—Wyo.—Utah—Ore. *Son.—Submont.* Je-Au.

26. *C. salicifolius* Rydb. Shrub, 3-10 dm. high, branches erect, finely pannose-tomentulose, leaves linear, 3-nerved, 4-6 cm. long, 3-6 mm. wide, minutely tomentulose; heads in a dense corymbiform cyme; involucre 7-8 mm. long; corollas about 1 cm. long; achenes coarsely strigose, angled. *B. graveolens latusquamea* A. Gray. Valleys: Utah. *Son.—Submont.* Au-S.

27. *C. stenophyllus* (A. Gray) Greene. Low shrub, 1-3 dm. high, much branched; bark white or straw-colored; leaves somewhat involute and twisted, spreading, 2-3 cm. long; bracts in three series, linear, thin, the outer acute, the innermost rounded at the apex; achenes strigose. *C. pumilus varus* A. Nels. *B. Douglasii stenophylla* A. Gray. Dry ridges and stony slopes: Nev.—Mont.—Wyo.—Ariz. *Submont.* Au-S.

28. *C. laricinus* Greene. Low shrub, 2-3 dm. high, fastigiately branched; leaves filiform, 1-1.5 cm. long, scabrous-puberulent on the margins; heads few and corymbose; involucre about 5 mm. high; bracts ovate-lanceolate, somewhat keeled, acute with the apex slightly spreading; achenes densely strigose. Valleys: c Utah—Ariz. *Son.* Au-S.

29. *C. pumilus* Nutt. Low shrub, 1-3 dm. high; branches glabrous, whitish, shining; leaves narrowly linear, 2-4 cm. long, sometimes involute, rarely somewhat twisted; involucre about 5 mm. high; bracts mostly lanceolate, glabrous, acute or the inner obtuse; achenes sparingly strigose. *B. Douglasii pumila* A. Gray. Plains and foothills: Mont.—Colo.—Utah.—Ore. *Plain—Submont.* JI-S.

30. *C. elegans* Greene. Low shrub, 1-3 dm. high, branched; branches glabrous, straw-colored; leaves narrowly linear, 1-3 cm. long, 1-2 mm. wide, 3-nerved, strongly twisted; involucre about 6 mm. high; bracts lanceolate, acute, glabrous; achenes sparingly strigose. Plains and dry valleys: Colo.—N.M. *Submont.* Jl—Au.

31. *C. linifolius* Greene. Shrub, 6-10 dm. high, fastigiate branched; branches glabrous, white, striate; leaves ascending, linear-lanceolate, acute, 3-nerved, 2-4 cm. long, 5-8 mm. wide; involucre about 7 mm. high; bracts oblong, obtuse; achenes densely hirsute-strigose. *B. linifolia* A. Nels. Dry plains and river bottoms: Wyo.—Colo. *Plain—Submont.* Au—S.

32. *C. stenolepis* Rydb. Low shrub, 2-3 dm. high, somewhat spinescent, branches short, erect, glabrous or finely puberulent above; leaves narrowly lance-linear, 1-2 cm. long, 2-4 mm. wide, somewhat twisted; involucre about 8 mm. long; achenes hirsute-strigose. Dry hills: Mont.—Wyo.—Utah—Ida. *Plain—Submont.* Au—S.

33. *C. glaucus* A. Nels. Shrub, 3-10 dm. high; leaves ascending, narrowly linear-lanceolate, acute, obscurely 3-nerved, 2-4 cm. long, usually somewhat twisted, bluish green; bracts subcarinate, membranous, glabrous; achenes silky-strigose. *C. serrulatus* (Torr.) Rydb. *B. Douglasii serrulata* A. Gray. *C. leuclidus* Greene. Dry plains and slopes: Wyo.—Colo.—Utah—Ariz. *Submont.*

34. *C. viscidiflorus* (Hook.) Nutt. Shrub, 6-12 dm. high; leaves linear, 3-5 cm. long, 3-nerved, 2-4 mm. wide; involucre about 7 mm. high; bracts thin, oblong; achenes strigose. *B. Douglasii* A. Gray. Dry plains: Mont.—Wyo.—Calif.—Wash. *Plain—Son.* Jl—S.

35. *C. latifolius* (D. C. Eat.) Rydb. Low shrub; leaves oblanceolate or oblong, acute, 3-5-nerved, glabrous, 2-4 cm. long, 5-8 mm. broad; involucre 6 mm. high. *Lenosyris viscidiflora latifolia* D. C. Eat. Mountains: Nev.—Ida.—Utah. *Submont.* S.

36. *C. lanceolatus* Nutt. Undershrub, 1-3 dm. high; branches straw-colored or gray, finely puberulent; leaves linear-lanceolate, 2-4 cm. long; involucre 7-8 mm. long; outer bracts lanceolate, acute, the inner oblong, obtuse, glabrous, or the outer puberulent; achenes hispid-strigose. *B. Douglasii lanceolata* A. Gray. *B. Douglasii spathulata* M. E. Jones, a form with short lower leaves. Dry plains and hills: Mont.—Colo.—Nev.—Wash. *Plain—Submont.* Au—S.

37. *C. puberulus* (D. C. Eat.) Greene. Undershrub, 1-3 dm. high; branches finely puberulent; leaves narrowly linear, 2-4 cm. long, densely puberulent; involucre 6-7 mm. long; bracts glabrous, lanceolate or the inner linear, acute, somewhat viscid; achenes sparingly strigose. *B. Douglasii puberula* A. Gray. Dry plains and hills: B.C.—Mont.—Colo.—Calif. *Son.—Mont.* Jl—S.

38. *C. marianus* Rydb. Undershrub, 1-2 dm. high, with a woody thick caudex; leaves linear or the lower linear-oblanceolate, acute, thick, 1-2 cm. long, 1-15 mm. wide; bracts yellowish, glutinous, erose-ciliate on the margins, the outer ovate, acutish, the inner spatulate-oblong, rounded at the apex; achenes sparingly strigose. Valleys: Utah. *Son.* Jl.

39. *C. leiospermus* (A. Gray) Greene. Shrub, 3-6 dm. high; branches white-tomentose, or in age glabrate; leaves sparse, involute-filiform (in var. *breviata* about 1 cm. long or less); bracts oblong, or the inner linear-oblong, rounded at the apex; achenes glabrous. *B. leiosperma* A. Gray. Desert regions: s Utah—Nev. *L. Son.*

40. *C. glareosus* (M. E. Jones) Rydb. Undershrub, growing in dense clumps, about 3 dm. high; leaves linear-oblanceolate, the upper reduced, oblong, and bract-like; inflorescence corymbiform; bracts about 4 in each vertical row, sparsely lacerate on the margins and white-tomentulose, obtuse or rounded at the apex, the lower small, ovate, the upper with conspicuous thickened tips, linear; corolla fully 1 cm. long. *B. glareosa* M. E. Jones. Mesas: c Utah. *Submont.* O.

41. *C. Vaseyi* (A. Gray) Greene. Perennial, with a caespitose woody caudex, 1-2 dm. high, glabrous; leaves linear-oblanceolate, obtuse, thick, glabrous, 1-2.5

cm. long, 1–3 mm. wide; inflorescence fastigiate-cymose; bracts oblong, rounded at the apex, all but the innermost with a thickened greenish tip; achenes glabrous or slightly puberulent. *C. Bakeri* Greene. Mountains: Wyo.—Colo.—Utah. *Submont.* Jl–S.

42. *C. turbinatus* (M. E. Jones) Rydb. Shrub, about 1 m. high, bushy; leaves long and narrow, canaliculate, the uppermost much reduced, glabrous, or slightly viscid in the inflorescence; bracts 5 or 6 in each vertical row, the lowest minute, all obtuse, merely apiculate, with a darker center, the inner oblong to linear, 8 mm. long. *B. turbinata* M. E. Jones. Gravel: Utah. *Son.* S.

15. *ISOCOMA* Greene.

Herbaceous or shrubby plants, usually with viscid foliage. Leaves alternate, entire, toothed, or pinnately parted. Heads discoid. Involucres mostly campanulate, several- to many-flowered; bracts leathery, obtuse or acutish, well imbricate, with more or less thickened tips. Disk-flowers perfect; corolla yellow, the throat much inflated. Tips of the style-branches subulate, lanceolate or broader. Achenes short, broadened upwards, usually silky-strigose. Pappus of numerous barbellate bristles.

Bracts acute, linear-lanceolate.
Bracts obtuse or obtusish, linear, oblong, or oblanceolate.

Leaves 1-ribbed, the lower often toothed.

Plant herbaceous, except the suffruticose base; bracts comparatively thin.

Plant shrubby; bracts much thickened, especially at the apex.
Leaves triple-nerved, entire

1. *I. pluriflora*.

2. *I. Wrightii*.

3. *I. acradenia*.

4. *I. scopulorum*.

1. *I. pluriflora* (T. & G.) Greene. Suffrutescent; stems angular, glabrous; leaves narrowly linear, obscurely 1-nerved, 3–6 cm. long; heads 8 mm. high, 5 mm. broad, 15–18-flowered, crowded at the ends of the branches in a fasciculate corymb; bracts smooth, shining, not thickened at the apex. *Bigelovia pluriflora* A. Gray. Plains: Colo. *Son.*

2. *I. Wrightii* (A. Gray) Rydb. Stems 3–6 dm. high, strict, glabrous; leaves thickish, narrowly linear, entire, or the lower toothed, somewhat scabrous; heads 5–6 mm. high, 4–5 mm. broad, 7–15-flowered, numerous in a large corymbiform cyme; bracts oblong or broadly lanceolate, obtuse. *Linosyris Wrightii* A. Gray. *B. Wrightii* A. Gray. Banks and saline soil: Tex.—Colo.—Utah—Ariz.; n Mex. *Son.* Au–S.

3. *I. acradenia* Greene. Low shrub, 3–6 dm. high, much branched, glabrous and glutinous; leaves narrowly oblanceolate, entire, 2–4 cm. long; heads 6–8 mm. high, 6–10-flowered, corymbose-clustered; bracts oblong, obtuse, with a conspicuous gland; achenes strigose. Desert regions: s Calif.—s Utah—Ariz. *L. Son.* S–O.

4. *I. scopulorum* (M. E. Jones) Rydb. Low shrub, about 5 dm. high, with straw-colored branches; leaves linear, 2–7 cm. long, acute, finely puberulent or glabrate, scabrous on the entire margins; heads few, corymbose; involucre turbinate, nearly 1 cm. high; bracts well imbricate in 6–7 series, elliptic to oblong, yellowish, with a green spot on the back; achenes hispid. *B. Menziesii scopulorum* M. E. Jones. *Hesperodoria scopulorum* Greene. Cañons: s Utah. *Son.*—*Submont.* Au–S.

16. *PRIONOPSIS* Nutt.

Annual or biennial, caulescent glabrous herbs. Leaves alternate, sessile, spinulose-toothed. Heads radiate, showy. Involucres broadly hemispheric; bracts well imbricate in several series, the outer spreading; receptacle naked. Ray-flowers numerous, pistillate; ligules yellow. Disk-flowers numerous, perfect; corolla yellow. Anthers obtuse at the base. Style-branches with linear-lanceolate appendages. Achenes glabrous, those of the rays broader. Pappus of few firm, hair-like bristles, the outer often shorter; all deciduous.

1. *P. ciliata* Nutt. Stem 8–15 dm. high, sparingly branched, glabrous; leaves numerous, oval, ovate, or oblong, saliently dentate, with spinulose-tipped teeth; heads few, corymbose; involucre about 1 cm. high, 2–2.5 cm. broad; bracts

linear-lanceolate, acuminate, squarrose; ligules numerous, 1-1.5 cm. long. *Aplopappus ciliatus* DC. River banks and hillsides: Mo.—Tex.—Colo. *Plain.*

17. *SIDERANTHUS* Nutt. IRON PLANT.

Perennial or annual herbs, rarely suffruticose at the base. Leaves alternate, with spinulose-tipped lobes or teeth. Heads radiate, or in two species discoid. Involucres campanulate or hemispheric, many-flowered; bracts well imbricate, in 3-5 series, appressed or with loose tips, green; receptacle flat, naked, usually pitted. Ray-flowers pistillate, or in two species wanting; ligules yellow. Disk-corollas yellow; tube scarcely dilated into a distinct throat. Anthers obtuse at the base. Style-branches flattened, with lanceolate appendages. Achenes obtuse, pubescent, mostly 8-10-nerved. Pappus of many unequal hair-like bristles in 1-3 series, persistent.

Leaves spinulose-toothed, not pinnatifid

Heads discoid, perennials, with woody caudex.

Heads peduncled

Heads sessile.

Heads radiate; annuals

Leaves oblanceolate, spinulose-tipped; plant more or less viscid

Leaves linear-oblanceolate, bristle-tipped, plant strigose

Leaves pinnatifid, perennials, with a short woody base, achenes somewhat flattened

Stem more or less floccose or cinereous, especially when young

Plant cinereous pubescent, more or less glandular.

Plant more or less floccose, not at all glandular.

Plant neither floccose nor cinereous

Plant perfectly glabrous or sparingly glandular-puberulent

Plant finely puberulent, or hispid

Heads hemispheric, bracts slightly glandular

Heads somewhat turbinate, bracts densely glandular-puberulent

1 *S. grindelioides*.

2 *S. aberrans*

3 *S. annuus*.

4 *S. gracilis*

5 *S. australis*

6 *S. spinulosus*.

7 *S. glaberrimus*

8 *S. puberulus*.

9 *S. turbinellus*

1. *S. grindelioides* (Nutt.) Rydb. Low caespitose perennial; stems erect, 1-3 dm. high, somewhat pubescent; leaves thick, obovate or oblanceolate, spinulose-serrate, 1-3 cm. long, more or less crisp-hirsute or strigose; involucres hemispheric, 6-7 mm. high, 1 cm. broad; bracts lanceolate, puberulent; achenes somewhat flattened. *Eriocarpum grindelioides* Nutt. *Aplopappus Nuttallii* T. & G. Dry plains and hills: Sask.—Neb.—N.M.—Ariz.—Nev.—Alta *Plain—Submont.* Je—Au.

2. *S. aberrans* (A. Nels.) Rydb. Perennial, with a creeping rootstock; stems erect, 5-10 cm. long, glandular-pubescent; leaves obovate or oblong, glandular-puberulent, or the lower ovate, 1-3 cm. long, sparingly cuspidate-toothed on the margins; heads 1-4, subsessile, 9-14 mm. high; bracts broadly linear, acute, green and glandular-viscid at the apex; achenes cylindric-fusiform, 3 mm. long *Macronema aberrans* A. Nels. Mountains: Ida. *Mont.* Au.

3. *S. annuus* Rydb. Annual; stem simple below, branched above, more or less glandular-pubescent; leaves oblanceolate, spinulose-dentate, 3-6 cm. long; heads corymbose; involucres hemispheric, about 8 mm. high, viscid-puberulent; bracts linear-lanceolate, acuminate; ligules light yellow, 5-6 mm. long; achenes obtusely 5-angled. *Aplopappus rubiginosus* A. Gray, in part. Sandy places: Neb.—Colo.—Tex. *Plain.*

4. *S. gracilis* (Nutt.) Rydb. Annual, branched, becoming woody at the base; stems 2-4 dm. high, hispid-strigose; leaves linear-oblanceolate to spatulate in outline, coarsely dentate or somewhat pinnatifid; teeth tipped with long bristles; involucres 6 mm. high; bracts linear, spinulose-tipped, strigose; ligules 5-6 mm. long, light yellow. *Dieteria gracilis* Nutt. *A. gracilis* A. Gray. Dry hills: s Colo.—Tex.—Ariz.—Calif.; Mex. *Son—Submont.* My—S.

5. *S. australis* (Greene) Rydb. Stem 2-4 dm. high; leaves pinnatifid, 2-7 cm. long; segments linear or oblong, spinulose-tipped, entire or toothed; involucres 6 mm. high; bracts linear, puberulent, spine-tipped; ligules 5-6 mm. long, yellow. *Eriocarpum australe* Greene. Dry soil: Colo.—Tex.—N.M.—Ariz.—e Utah; Mex. *Son.—Submont.* Ap—Je.

6. *S. spinulosus* (Pursh) Sweet. Stem 1-4 dm. high, branched; leaves 1-3 cm. long, pinnatifid; segments linear or oblong, usually toothed or pinnately

parted; involucre 6-8 mm. high; bracts linear-lanceolate, spinulose-tipped, vil-
lous-canescens; ligules 6-7 mm. long, bright yellow. *A. spinulosus* DC. Plains
and prairies: Sask.—Minn.—Tex.—Ariz.—Alta.; n Mex. *Son.*—*Plain*—*Submont.*
Je-S.

7. *S. glaberrimus* Rydb. Stems several, 1-3 dm. high; leaves rather
rigid, about 2 cm. long, bluish green, glabrous, pinnatifid; segments oblong,
spinulose-tipped; heads numerous, corymbose, depressed hemispherical, 8-15
mm. broad; bracts acute or spinulose-tipped; ligules 4-5 mm. long. Dry plains:
S.D.—Ia.—Tex.—N.M.—Wyo. *Plain.* Je-S.

8. *S. puberulus* Rydb. Stems less than 1.5 dm. high; leaves pinnatifid or
bipinnatifid; segments 1-5 mm. long, spinulose-tipped; heads 8-9 mm. high, 10-12
mm. broad; bracts narrowly linear-lanceolate, with small herbaceous tips, finely
puberulent; ligules about 20, 8-9 mm. long. Hills: Colo. *Submont.*—*Mont.*

9. *S. turbinellus* Rydb. A low and bushy puberulent perennial, 1.5-2 dm.
high; leaves pinnatifid or the upper reduced and merely toothed; segments nar-
row; heads numerous, small, 7-8 mm. high; bracts linear-lanceolate, acute, ap-
pressed; ligules 10-15, 7-8 mm. long. Dry plains: Ida. *Plain.* Au.

18. PYRROCOMA Nutt.

Perennial herbs, with thick taproots. Leaves alternate, sometimes with
spinulose teeth. Heads terminal, or in the axils of the upper leaves, radiate.
Involucre hemispheric; bracts more or less foliaceous; receptacle flat, alveolar.
Ray-flowers numerous, fertile or sterile; ligules yellow, sometimes not longer than
the disk. Disk-flowers yellow, perfect; corollas cylindric, slightly if at all dilated
upwards, with short, erect teeth. Appendages of the style-branches subulate-
linear, longer than the stigmatic portion. Achenes linear, 3-angled, striate,
usually glabrous. Pappus reddish brown or yellow, of numerous rigid bristles.

Heads apparently discoid, the sterile rays being concealed in the pappus.

Inner bracts recurved cuspidate.

1. *P. subsquarrosa.*

Bracts not recurved cuspidate.

Bracts oblong or oval, heads hemispheric.

Leaves and bracts more or less spinulose-toothed, the latter with a narrow
scarious margin.

2. *P. carthamoides*

Leaves and bracts not spinulose-toothed, the latter with a broad scarious erose
margin.

Pappus sordid; plant almost glabrous.

3. *P. rigida.*

Pappus brownish red, plant villous

4. *P. erythropappa.*

Bracts lanceolate, head campanulate-turbinate.

5. *P. Cusickii*

Heads distinctly radiate

Bracts except the innermost obtuse, obovate or oblong.

6. *P. crocea.*

Bracts mostly acute or acuminate.

Plant not glandular

Heads large, disk 2 cm. or more in diameter; bracts in about 3 series

Bracts almost of the same length

7. *P. insecticuriis.*

Outer bract decidedly shorter

Involucre and upper part of stem decidedly villous; bracts wholly foli-
aceous

Bracts oblanceolate, abruptly acute, achenes hirsute

8. *P. Clementis.*

Bracts lanceolate, long-acute; achenes glabrous.

9. *P. villosa.*

Involucral bracts almost glabrous except the ciliate margins, chartace-
ous at the base with foliaceous tips.

Leaves and stem glabrous, or the latter slightly villous.

Basal leaf-blades broadly lanceolate.

10. *P. lapathifolia.*

Basal leaf-blades narrowly oblanceolate

11. *P. integrifolia.*

Leaves hirtellous, stem hirsute-villous.

12. *P. scaberrula.*

Heads smaller; disk less than 2 cm. in diameter.

Bracts in 2-3 unequal series.

Leaves 5-15 mm. wide, disk 1-2 cm. wide.

Inflorescence corymbiform; bracts long-acute.

13. *P. lanceolata.*

Inflorescence racemiform; bracts abruptly acute.

Stem and bracts more or less white-woolly.

14. *P. lagopus.*

Stem and bracts glabrous or nearly so.

15. *P. vaseyi.*

Leaves 2-4 mm. wide, disk 1 cm. or less wide

16. *P. tenuicaulis.*

Bracts nearly of the same length.

Stem-leaves oblanceolate; bracts long-acuminate.

17. *P. acuminata.*

Stem-leaves lanceolate; bracts acute or short-acuminate

Plant villous.

18. *P. tnuloides.*

Plant, except the upper parts, glabrate in age.

19. *P. uniflora.*

Plant hirsute-villous, decidedly glandular

20. *P. hirta.*

trumpet-shaped, deeply 5-lobed. Anthers obtuse at the base. Style-branches stigmatic their whole length, with ovate to lanceolate-subulate appendages. Achenes densely silvery-villous. Pappus of white capillary bristles, rather deciduous.

1. **S. interior** (Coville) Rydb. Shrub 3–10 dm. high; branches green, slightly puberulent; leaves linear, fleshy, glandular-punctate, 1–2 cm. long; involucre hemispheric, about 1 cm. high; bracts linear, attenuate, glandular-granuliferous, ligules 9–11 mm. long, golden yellow. *Aplopappus interior* Coville. Hillsides in desert regions: s Calif.—s Utah—Ariz. *Son.* Ap-Jl.

20. OONÓPSIS Greene.

Perennial herbs with woody caudex or crown, and erect, leafy stems. Leaves linear or lanceolate, entire. Heads in terminal cymes or solitary. Involucres campanulate or hemispheric; bracts well imbricate, flat, cuspidate-acuminate. Ray-flowers pistillate or wanting; ligules yellow. Disk-corollas yellow, cylindric, with 5 short teeth. Tips of the style-branches ovate, shorter than the stigmatic part. Achenes glabrous or strigose, many-nerved. Pappus of rather few coarse bristles.

Dwarf; stem less than 1 dm. high, heads 6–10 mm. high.

Plant more or less villous, leaves flat; heads radiate.

Heads 6–8 mm. high; leaves 1–3 cm. long, not exceeding the stem

Heads 8–10 mm. high, leaves 4–8 cm. long, often overtopping the stem.

Plant glabrous; leaves involute, heads discoid.

Plant robust, 1.5–3 dm. high; heads 15–20 mm. high.

Heads discoid.

Heads clustered, 10–15 mm. high, achenes glabrous

Heads solitary, 15 mm. high or more, achenes glandular.

Heads radiate.

1. *O. multicaulis*

2. *O. argillacea*

3. *O. Engelmannii*

4. *O. Wardii*

5. *O. monocephala*

6. *O. foliosa*

1. **O. multicaulis** (Nutt.) Greene. Stems several, 1 dm. high or less, slightly villous; leaves narrowly linear, 1–3 cm. long, slightly villous, thick; heads corymbose; involucre turbinate; bracts ovate, lanceolate or oblong, cuspidate-acuminate; ligules 5–6, 4–5 mm. long. *Aplopappus multicaulis* A. Gray. Rocks: Wyo. *Submont.*

2. **O. argillacea** A. Nels. Stems numerous, 5–8 cm. long, sparingly villous; leaves entire, narrowly-linear, acute; involucre slightly villous, turbinate; bracts oblong-ovate or lanceolate, acuminate; rays about 10; ligules 5–6 mm. long. Clayey slopes: Wyo. *Submont.* Je-Jl.

3. **O. Engelmannii** (A. Gray) Greene. Stems 1–2 dm. high, glabrous, leafy; leaves narrowly linear, 3–5 cm. long, 2–3 mm. wide, rigid; heads rather many, in a congested cyme, about 12 mm. high; involucre turbinate-campanulate, shorter than the disk-flowers; bracts ovate or elliptic, short-cuspidate. *Bigelovia Engelmannii* A. Gray. Dry plains: Colo.—Kans. *Plain.* Au–O.

4. **O. Wardii** (A. Gray) Greene. Stems 1–2.5 dm. high, very leafy; leaves broadly linear or lanceolate, 1-nerved, or 3-nerved at the base, 6–12 cm. long, inflorescence dense, flat-topped; heads 15–25-flowered; bracts lanceolate, acuminate. *A. Fremontii Wardii* A. Gray. *O. condensata* A. Nels. Plains: Wyo. *Submont.* Jl–S.

5. **O. monocephala** A. Nels. Stems erect or ascending, 1–2 dm. high, leafy to the summit; leaves glabrous, linear-oblong, sessile, acute, 5–8 cm. long, about 1 cm. broad; bracts oblong, abruptly acuminate, glabrous or ciliate on the margins. Plains: Colo. *Plain.*

6. **O. foliosa** (A. Gray) Greene. Stems 2–3 dm. high, very leafy, glabrous, leaves lanceolate or oblong-lanceolate, 3–5-nerved, 5–10 cm. long; heads solitary or few together; involucre 15–20 mm. high; bracts glabrous, broadly lanceolate, acuminate; rays 12–15 mm. long; achenes glandular-puberulent. *Aplopappus Fremontii* A. Gray. Plains and rocky hills: Kans.—Colo. *Submont.* Je–S.

21. MACRONEMA Nutt.

Undershrubs, never resinous-punctate, with short branches, leafy up to the heads. Involucre campanulate; its bracts imbricate, in a few series of more or less unequal length, linear or lanceolate, the inner thin, chartaceous or somewhat scarious, the outer more or less foliaceous and passing into the leaves. Receptacle naked, alveolar. Ray-flowers, when present, ligulate, pistillate and fertile; ligules yellow, conspicuous. Disk-flowers perfect; corollas tubular-trumpet shaped, 5-lobed. Anthers obtuse at the base. Branches of the style stigmatic their whole length, with very long and attenuate-filiform appendages. Achenes slender, compressed, 5-nerved, soft-pubescent. Pappus of numerous white soft bristles.

Heads radiate, branches glandular, not tomentose.

Heads small, fastigate-clustered; disk 5-8 mm. in diameter.

Leaves broadly obovate, mucronate-cuspidate.

Leaves oblanceolate, acute or pointed.

Heads larger, solitary; disk 1 cm. or more in diameter.

Leaves oblanceolate, acute.

Leaves spatulate, obtuse or mucronate.

Heads discoid; branches white-tomentose.

Leaves oblong-oblanceolate

Outer bracts linear to oblong, acute.

Outer bracts broadly oblong, obtuse or mucronate.

Leaves linear.

1. *M. obovatum*.

2. *M. Watsoni*.

3. *M. suffruticosum*

4. *M. grindelifolium*.

5. *M. discoideum*.

6. *M. obtusum*.

7. *M. lineare*.

1. ***M. obovatum*** Rydb. Glandular-puberulent undershrub, 2-3 dm. high; leaves 1-2 cm. long, 7-10 mm. wide; heads usually 2-3 together, about 10 mm. high; bracts firm, oblong-linear, abruptly acute, unequal, imbricate in about 4 series; ligules about 10, short, 4-5 mm. long. Cañons and hillsides: Utah. *Submont.* Je-Au.

2. ***M. Watsoni*** (A. Gray) Greene. Glandular undershrub, 1-3 dm. high; leaves thin, 1-2 cm. long; heads fastigate-clustered, about 10 mm. high; bracts linear-lanceolate, attenuate, the outer 1 or 2, foliaceous; ligules 6-8 mm. long. *Aplopappus Watsoni* A. Gray. Mountains: Nev.—Utah—Ariz. *Submont.* Au-S.

3. ***M. suffruticosum*** Nutt. Undershrub, 1-2 dm. high; branches brown; leaves 2-3 cm. long, glandular-hirsute; heads solitary, 10-12 mm. high; bracts linear-lanceolate, acuminate or the outer foliaceous and attenuate; ligules 8-10 mm. long. *A. suffruticosus* A. Gray. Hills: Mont.—Wyo.—Ariz.—Calif. *Submont.*—Mont. Jl-S.

4. ***M. grindelifolium*** Rydb. Much branched undershrub, 1-2 dm. high; branches glandular-puberulent; leaves 1-2 cm. long, glandular-pubescent; margins more or less crisped; heads 1.5 cm. high; bracts few, linear-lanceolate or acute; ligules 6-12, conspicuous, often 1 cm. long. *M. grindelioides* Coult. & Nels. High mountains: Mont.—Wyo.—Ida.—Ore. *Submont.*—Mont. Jl-S.

5. ***M. discoideum*** Nutt. Low branched undershrub, 1-2 dm. high; leaves oblong to oblanceolate, 1-3 cm. long, glandular-puberulent; heads solitary, about 1.5 cm. high and broad; inner bracts few, linear-lanceolate, attenuate. *A. Macronema* A. Gray. Mountains: Colo.—Calif—Ore. *Submont.*—Alp. Jl-Au.

6. ***M. obtusum*** Rydb. Dense glandular-pubescent undershrub, 2-4 dm. high; leaves oblong-oblanceolate, about 3 cm. long, obtuse or mucronate; heads about 18 mm. high, 10-18 mm. in diameter; inner bracts acute, scarcely more than half as long as the flowers. Mountains: Colo. *Mont.* Jl.

7. ***M. lineare*** Rydb. Low undershrub, woody only at the base, 1-2 dm. high; leaves numerous, linear, acute, glandular-puberulent, sometimes also more or less tomentose; heads 1-1.5 cm. high; bracts few, linear, acuminate, the outer foliaceous. Sandy or gravelly places: Wyo. *Submont.* Au.

22. STENOTUS Nutt.

Low perennials, with caespitose woody caudices and narrow, entire, more or less coriaceous and evergreen (except in the last species), mostly basal leaves. Involucre hemispherical or nearly so; its bracts imbricated in a few rows, ap-

pressed, thin, lanceolate to oval, not herbaceous. Receptacle naked, alveolar. Ray-flowers ligulate, pistillate and fertile; ligules yellow, conspicuous. Disk-flowers perfect; corollas tubular, somewhat enlarged upwards, deeply 5-toothed. Anthers obtuse at the base. Style-branches stigmatic their whole length, with subulate appendages. Achens grayish or white villous. Pappus of numerous white soft capillary scabrous bristles.

Plant glabrous or puberulent; leaves firm and evergreen.

Leaves linear to filiform, 1 mm. wide.

1 *S. stenophyllus*

Leaves mostly oblanceolate.

Bracts lanceolate, acute.

Plant puberulent

Bracts in 3 series, broad, with broad scarious margins

2 *S. acaulis*.

Bracts in 2 series, narrow, with narrow scarious margins.

3 *S. Andersonii*.

Plant glabrous, except the scabrous leaf-margins.

Bases of the basal leaves much enlarged, somewhat inflated and remaining for years on the short caudal branches, leaf-blades narrowly oblanceolate to linear.

Stem-leaves oblanceolate, 1-4 cm. long.

4 *S. caespitosus*.

Stem-leaves linear, 4-7 cm. long

5 *S. falcatus*

Bases of the basal leaves neither much enlarged nor persistent; leaf-blades broadly oblanceolate or spatulate.

6 *S. latifolius*

Bracts oval or oblong, very obtuse

7 *S. armerioides*.

Plant floccose, leaves softer, not evergreen.

8 *S. lanuginosus*.

1. *S. stenophyllus* (A. Gray) Greene. Stems about 5 cm. high; leaves 1-2 cm. long, hirsutulous-scabrous; involucre 6-8 mm. high, puberulent; bracts linear, attenuate, with narrow scarious margins. *Aplopappus stenophyllus* A. Gray. Mountains and stony hills: Wash.—Ida.—Calif. *Submont.*—*Mont.* Ap-Je.

2. *S. acaulis* Nutt. Plant 2-10 cm. high; leaves oblanceolate or spatulate, 3-nerved; flowering stems scapiform; heads solitary, about 1 cm. high; bracts lanceolate or ovate-lanceolate; ligules 8 mm. long. *A. acaulis* A. Gray. Dry hills and bad lands: Sask.—Colo.—Calif.—Wash. *Plain*—*Submont.* My-Je.

3. *S. Andersonii* Rydb. Flowering stems about 1 dm. high, leafy at the base; leaves narrowly oblanceolate, not very rigid, distinctly 3-ribbed, 3-5 cm. long, 3-4 mm. wide; bracts narrowly lanceolate. Open dry hills: Mont. *Plain.* Jl.

4. *S. caespitosus* Nutt. Stems 5-15 cm. high; basal leaves linear-oblanceolate, 3-nerved, glabrous except the scabrous-ciliate margins, 3-5 cm. long; heads about 1 cm. high; bracts lanceolate, acuminate; ligules 8 mm. long. *A. acaulis glabratulus* A. Gray. Dry hills: Sask—Wyo.—Nev.—Mont. *Plain*—*Submont.* Je-Jl.

5. *S. falcatus* Rydb. Flowering stems 10-15 cm. high, leafy; basal leaves oblanceolate, rigid, obtuse or acute, 4-5 cm. long, 3-ribbed; stem-leaves linear, more or less falcate; heads about 1 cm. high; bracts lanceolate, acute, with scarious margin; ligules 6-7 mm. long. Dry hills: s Utah. *Son.* Je.

6. *S. latifolius* A. Nels. Flowering stems slender, leafy, 10-15 cm. high, striate; leaves spatulate or broadly lanceolate, 2-3 cm. long, more distributed along the stem than in the other species; heads solitary, 10-12 mm. high; bracts elliptic-lanceolate, abruptly short-acuminate; ligules 8 mm. long, orange. Rock-crevices: Utah. *Submont.* Je.

7. *S. armerioides* Nutt. Flowering stems 5-15 cm. high, glabrous or slightly scabrous-puberulent; leaves linear or linear-oblanceolate, 3-nerved, glabrous or nearly so, 3-7 cm. long; heads 10-13 mm. high; ligules 10-12 mm. long. *A. armerioides* A. Gray. Dry hills and badlands: Man.—Neb.—N.M.—Wyo.—Sask. *Plain*—*Submont.* Je-Jl.

8. *S. lanuginosus* (A. Gray) Greene. Stem 1-2 dm. high, more or less floccose; leaves narrowly linear-oblanceolate, 3-6 cm. long; heads solitary, 1 cm. high; bracts linear-lanceolate, acute or acuminate, scarious-margined; ligules 8-10 mm. long. *A. lanuginosus* A. Gray. High ridges: Wash.—Mont.—Ore. *Submont.* My-Jl.

23. **TONÉSTUS** A. Nels.

Dwarf herbaceous perennials, with woody taproots and short caudices. Leaves spatulate to linear, entire, alternate. Heads solitary, terminal, radiate. Involucres campanulate or hemispheric; bracts loosely imbricate, in 2-3 series, more or less foliaceous, the outer ones often leaf-like. Ray-flowers many, yellow, pistillate. Disk-corollas yellow, somewhat enlarged upwards, deeply 5-toothed. Appendages of the style-branches oblong to subulate. Pappus soft and white.

Basal leaves oblanceolate, spatulate, or oblong; bracts lanceolate or oblanceolate.

Bracts acute; plants glandular or viscid

Bracts lacerate or ciliate; stem-leaves linear or linear-lanceolate, long-ciliate.

Bracts neither lacerate nor ciliate; stem-leaves oblanceolate, not ciliate

Bracts obtuse; plant soft-pubescent or glabrate, scarcely viscid.

Leaves and bracts linear

1. *T. laceratus*

2. *T. Lyallii*

3. *T. pygmaeus*

4. *T. linearis*

1. ***T. laceratus*** (Henders.) A. Nels. Stem 1 dm. high or less, glandular-puberulent; basal leaves spatulate to narrowly oblanceolate; involucres 1 cm. high and wide; bracts subequal in 2 or 3 series, lanceolate, hyaline-margined; achenes densely sericeous. *Aplopappus laceratus* Henders. Mountains, among rocks: Ida. *Subalp.*—*Alp.* JI.

2. ***T. Lyallii*** (A. Gray) A. Nels. Stem 1 dm. high or less; leaves oblanceolate or spatulate, or the upper oblong; involucres about 1 cm. high and broad; bracts lanceolate, glandular-puberulent; achenes glabrous or nearly so. *A. Lyallii* A. Gray. High mountains: Alta.—Colo.—Ida.—Wash.—B.C. *Mont.*—*Alp.* JI—Au.

3. ***T. pygmaeus*** (T. & G.) A. Nels. Stem 2-5 cm. high; leaves linear-spatulate to spatulate-oblong, 2-4 cm. long; heads 8-10 mm. high; bracts oblong to oval; achenes silky-strigose. *Stenotus pygmaeus* T. & G. *A. pygmaeus* A. Gray. High mountains: Wyo.—N.M. *Alp.*—*Subalp.* Je—Au.

4. ***T. linearis*** Nels. & Macbr. Stem about 1 dm. long; leaves all narrowly linear, 3-nerved, minutely crisp-pubescent, 2-4 cm. long; bracts about 1 cm. long, with narrow scarious margins, in 2 series; ligules broadly linear; achenes minutely pubescent. Mountains: Ida.

24. **OREOCHRYSUM** Rydb. MOUNTAIN GOLD.

Plants with slender horizontal rootstock, leafy, viscid-puberulent above. Involucral bracts oblong, pale, rather obscurely 1-ribbed, chartaceous or the outer foliaceous, in about three moderately unequal ranks. Rays several, short. Disk-corollas narrowly trumpet-shaped, deeply 5-toothed. Style-appendages lanceolate, longer than the stigmatic portion. Achenes angled. Pappus white or slightly tawny, of soft scabrous bristles.

1. ***O. Parryi*** (A. Gray) Rydb. Stem 1-4 dm. high, puberulent or somewhat viscid above; basal leaves petioled, 5-15 cm. long; blades spatulate or oblanceolate, glabrous; stem-leaves oval to oblong, sessile; heads 10-12 mm. high; ligules 5-6 mm. long, pale yellow, 1 mm. wide; achenes glabrous. *Aplopappus Parryi* A. Gray. Mountains: Wyo.—N.M.—Ariz.—Utah; Mex. *Submont.*—*Subalp.* JI—S.

25. **SOLIDAGO** L. GOLDENROD.

Perennial caulescent herbs, mostly with rootstocks (all ours), rarely shrubby at the base. Leaves alternate, often toothed. Heads small, several-flowered, paniculate or thyrsoid, radiate. Involucres campanulate, turbinate, or cylindrical; bracts in several series, well imbricate, ribless; receptacle small, alveolate. Ray-flowers pistillate; ligules yellow, short. Disk-flowers hermaphrodite, fertile; corolla usually yellow, tubular to narrowly campanulate, 5-lobed. Anthers obtuse at the base. Style-branches flattened; appendages lanceolate. Achenes terete, usually ribbed. Pappus of many rough hair-like bristles, in 1-2 series.

Leaves glabrous or slightly pubescent along the veins and on the margins.

Leaves not triple-veined; branches of the inflorescence not recurved-spreading; heads not secund.

- Bracts of the inflorescence lanceolate or linear-lanceolate, acute or acuminate
 Leaves ciliate at the base. I. VIRGA-AUREAE.
 Leaves not ciliate at the base. IV. GLABERRIMAE.
 Bracts of the inflorescence oblong or linear-oblong, obtuse
 Leaves, at least the basal ones, toothed; stem-leaves few; plants 1-4 dm. high. II. HUMILES.
 Leaves all entire; stem very leafy, 4-8 dm. high III. SPECIOSAE
 Leaves triple-veined; heads more or less secund, on recurved-spreading branches
 (except usually in Nos. 9 and 11).
 Plants slender, not very leafy, 2-4 dm. high; stem-leaves narrowly oblanceolate
 or linear. IV. GLABERRIMAE
 Plant tall, leafy, 4-10 dm. high
 Stem-leaves lanceolate. V. SEROTINAE.
 Stem-leaves obovate. VI. RADULAE.
 Leaves densely canescent.
 Bracts not squarrose.
 Leaves lanceolate; bracts narrowly linear-lanceolate. V SEROTINAE
 Leaves, at least the lower ones, oblanceolate or obovate VII INCANAE
 Bracts squarrose, leaves numerous, entire, elliptic. VIII. WARDIANAE.

I. VIRGA-AUREAE.

- Plants low and slender, 1-3 dm. high; inflorescence corymbiform; branches with a single
 or a few corymbose heads.
 Heads 7-9 mm. high; inner bracts linear-lanceolate, of about the same length as the
 flowers and pappus; plant 2-3 dm. high. 1 *S. scopulorum*.
 Heads 5-7 mm. high; bracts lanceolate, the inner shorter than the flowers and the
 pappus; plant usually less than 2 dm. high. 2 *S. ciliosa*
 Plants stout, 3-4 dm. high; inflorescence paniculate, but narrow, branches racemiform;
 heads 7-9 mm. high
 Basal leaves broadly oblanceolate, acute; stem pubescent 3 *S. rubra*
 Basal leaves narrowly oblanceolate, obtuse, stem glabrous up to the inflorescence
 4 *S. laetiaulis*

II HUMILES.

- Plant low, 1-1.5 dm. high, inflorescence with few heads, short, congested.
 5 *S. decumbens*
 Plant taller, 2-4 dm. high; inflorescence with many heads, elongate
 Leaves not ciliate, bracts oblong; inflorescence usually narrow 6 *S. oreophila*
 Leaves ciliate at the base, bracts linear, inflorescence open. 7 *S. dilatata*

III SPECIOSAE.

- One species. 8. *S. pallida*

IV. GLABERRIMAE.

- Heads less than 5 mm. high; stem slender.
 Inflorescence decidedly viscid, leaves indistinctly triple-veined 9. *S. viscidula*
 Inflorescence not viscid; leaves distinctly triple-veined.
 Plant glaucous, bracts thick, oblong, obtuse 10 *S. glaucophylla*
 Plant not glaucous, bracts not thick, linear-lanceolate to oblong-lanceolate
 Inflorescence narrow, scarcely secund; bracts linear-lanceolate.
 Inflorescence usually open and more or less secund; bracts oblong-lanceolate.
 11. *S. missouriensis*
 12 *S. glaberrima*.
 Heads 6-7 mm. high; stem stout. 13 *S. concinna*

V. SEROTINAE

- Inflorescence narrowly rhombic in outline, branches ascending, almost straight, scarcely
 secund. 14. *S. elongata*
 Inflorescence broad, branches recurved-spreading, distinctly secund
 Leaves green, sparingly pubescent or glabrous, pubescence scabrous, mostly confined
 to the margins and the veins
 Stem usually glabrous up to the inflorescence, leaves glabrous except on the margins
 and on the midveins
 Veins of the leaves glabrous, heads 5-6 mm. high, in a short panicle with strongly
 curved branches 15 *S. serotina*
 Veins of the leaves pubescent below; heads 4-5 mm. high, panicle with long
 branches 16. *S. salebrosa*
 Stem more or less pubescent.
 Heads 5 mm. or more high; leaves pubescent 17 *S. polyphylla*.
 Heads about 4 mm. high; plant comparatively slender.
 Leaves pubescent, at least on the veins 18 *S. canadensis*
 Leaves glabrous, except the scabrous-cillolate margins 19. *S. serra*.
 Leaves densely canescent, especially beneath.
 Leaves usually broadly lanceolate.
 Leaves scabrous above. 20. *S. dumetorum*.
 Leaves softly puberulent on both sides. 21. *S. pruinosa*.
 Leaves linear-lanceolate, finely and rather softly canescent on both sides, more or
 less yellowish gray. 22. *S. gilvocanescens*.

One species.

VI. RADULAE.

23. *S. Garretttii*.

VII INCANAE.

Plant low, 1-2 dm. high; inflorescence corymbiform, branches not secund

Bracts oval to oblong, obtuse

24. *S. nana*.

Bracts lanceolate, acute

25. *S. nitea*.

Plants tall, 2-6 dm. high, inflorescence narrow, or if open with distinctly secund branches

Bracts oblong or linear, obtuse; stem-leaves scarcely triple-veined; inflorescence usually narrow.

Stem-leaves oblanceolate

26. *S. pulcherrima*.

Stem-leaves spatulate or broadly oblanceolate.

27. *S. radulina*.

Bracts lanceolate or ovate, acute; stem-leaves distinctly triple-veined, inflorescence usually more open

Stem-leaves oblanceolate or elliptic; bracts lanceolate

28. *S. trinervata*.

Stem-leaves obovate, thick, bracts ovate

29. *S. mollis*.

VIII WARDIANAE

One species.

30. *S. Wardii*.

1. *S. scopulorum* (A. Gray) A. Nels. Stem glabrous below, pilose above; basal leaves 5-15 cm. long; blades oblanceolate or spatulate, usually obtuse, crenate or serrate towards the apex; upper stem-leaves lanceolate or linear-lanceolate, sessile; bracts acute, ciliolate; achenes strigose. *S. corymbosa* Nutt., not Ell. *S. multiradiata scopulorum* A. Gray. Hills and mountains: Alta.—Colo.—Utah.—B.C. *Mont.* Je—Au.

2. *S. ciliosa* Greene. Stem 1-2 dm. high, decumbent at the base, glabrous below, pilose above; basal leaves spatulate, serrate-crenate towards the apex, 2-5 cm. long, tapering into a short petiole; stem-leaves linear-lanceolate to linear-oblanceolate, entire, sessile, ciliolate; heads in a small dense thyrsus; achenes strigose. Higher mountains: Alta.—Colo.—Ariz.—B.C. *Mont.*—Alp. Je—S.

3. *S. rubra* Rydb. Stem about 3 dm. high, pubescent, reddish; basal and lower cauline leaves 6-12 cm. long, firm, bluish green, glabrous, serrulate and minutely scabrous on the margins; upper stem-leaves sessile and lanceolate; bracts narrowly linear-lanceolate, ciliolate; achenes strigose. Mountains: Colo. *Mont.* S.

4. *S. laevicaulis* Rydb. Stem rather tall, 4-7 dm. high, light-colored and shining; basal leaves rather thin, obtuse, 5-10 cm. long, entire or crenate, glabrous except the scabrous margin; upper stem-leaves narrowly lanceolate, sessile; branches nearly erect; bracts narrowly linear-lanceolate, acute, ciliolate on the margins; achenes sparingly strigose. Mountains: Colo.—Wyo. Jl—S.

5. *S. decumbens* Greene. Stem low, decumbent at the base, glabrous or nearly so; basal leaves spatulate or oblanceolate, obtuse or rounded at the apex, crenate-serrate towards the end; upper leaves narrower; bracts linear or oblong; heads 6-8 mm. high; achenes strigose-hirsute. *A. humilis nana* A. Gray. Higher mountains: Wyo.—N.M. *Subalp.*—Alp. Jl—S.

6. *S. oreophila* Rydb. Stem glabrous or nearly so, often tinged with red; lower leaves spatulate, rounded and serrate or crenate at the apex, 3-10 cm. long, glabrous; stem-leaves oblanceolate, entire or nearly so; panicle narrow; heads about 8 mm. high; bracts linear; achenes hirsute-strigose. *S. humilis* A. Gray, in part, not Nutt. Mountains. B.C.—Mack.—Colo. *Mont.*—*Subalp.* Jl—S.

7. *S. dilatata* A. Nels. Stem glabrous, 4-6 dm. high; basal leaves glabrous, scabrous-ciliolate, oblong-spatulate to elliptic, 1-1.5 dm. long, serrate; stem-leaves lanceolate, the upper sessile; heads numerous, in a rather open panicle, 6-8 mm. high; bracts linear, most of them obtuse; achenes slightly hirsute. Mountains: Mont.—Colo. *Submont.*—*Mont.* Jl—Au.

8. *S. pallida* (Porter) Rydb. Stem 4-8 dm. high, glabrous; leaves obovate-spatulate to lanceolate, 5-15 cm. long, acute, entire, pale; heads very numerous, in a dense, elongated-conic panicle; disk 5-6 mm. high; bracts oblong or linear-oblong, glabrous; achenes glabrous or nearly so. *S. speciosa pallida* Porter. Hills: S.D.—Neb.—Colo. *Plain*—*Submont.* Au—S.

9. *S. viscidula* Rydb. Stem low, about 2 dm. high, finely pubescent, reddish; lower leaves narrowly linear-ob lanceolate, finely puberulent and somewhat viscid, denticulate, obtuse or acutish; inflorescence paniculate but flat-topped; branches scarcely secund; heads numerous, small, about 5 mm. high; bracts linear, obtusish, viscid; achenes strigose. Mountains: Colo. *Mont.* Au.

10. *S. glaucophylla* Rydb. Stem slender, pale, glabrous; leaves glabrous, minutely ciliate on the margins, rather thick, linear-ob lanceolate or the upper linear, 6-10 cm. long, entire, acute; inflorescence a round-topped panicle; heads about 5 mm. high; achenes slightly strigose-hirsute. Valleys: *Mont.*—Wyo. *Plain*—*Submont.* Jl-S.

11. *S. missouriensis* Nutt. Stem slender, 3-4 dm. high, glabrous; leaves linear-ob lanceolate, glabrous, scabrous-ciliate, 5-15 cm. long, acute, the lower petioled and sometimes serrate, the upper sessile and entire; heads 4-5 mm. high; bracts acute, glabrous. *S. Tolmieana* A. Gray. Mountains: B.C.—Ore.—Colo.—S.D.—Alta. *Submont.* Jl-Au.

12. *S. glaberrima* Martens. Stem 2-4 dm. high, glabrous up to the inflorescence; lower leaves narrowly ob lanceolate, 3-15 cm. long, often serrate or entire, glabrous, ciliate; inflorescence flat-topped or round-topped; heads about 5 mm. high; achenes sparingly hirsutulous. *S. missouriensis* A. Gray, not Nutt. Plains and hills: Mich.—Mo.—Tex.—Ariz.—Ida.—Alta. *Plain*—*Mont.* Jl-S.

13. *S. concinna* A. Nels. Stem glabrous, 2-4 dm. high, densely leafy; basal leaves ob lanceolate, 8-15 cm. long, serrate or entire; stem-leaves narrowly ob lanceolate or linear-oblong; panicle round-topped, usually open; bracts oblong, acute, thin-margined; achenes pubescent. *S. missouriensis extraria* A. Gray. Mountains: Alta.—Colo.—B.C. *Submont.*—*Mont.* Jl-S.

14. *S. elongata* Nutt. Stem 3-10 dm. high, glabrous below, finely puberulent above; leaves narrowly lanceolate, acuminate, 5-10 cm. long, distantly serrate, with sharp teeth, more or less puberulent; heads about 5 mm. high; bracts linear or linear-lanceolate, acute; achenes sparingly hirsutulous. Low ground: B.C.—*Mont.*—Nev.—Wyo.—Calif. *Submont.* Jl-S.

15. *S. serotina* Ait. Stem 5-20 dm. high; leaves lanceolate, 5-15 cm. long, sessile, usually sharply serrate; inflorescence short-pyramidal, dense; bracts linear or linear-lanceolate, obtuse or acutish; achenes hirsutulous. *S. Pitcheri* Nutt., the western form, with shorter inflorescence. Meadows, valleys, and along streams: Newf.—Ga.—Ark.—Colo.—B.C. *Plain*—*Submont.* Jl-S.

16. *S. salebrosa* (Piper) Rydb. Stem 5-20 dm. high; leaves narrowly lanceolate, sessile, sharply serrate, acuminate or the uppermost entire, 5-10 cm. long, thick; panicle large; bracts narrowly linear, acutish; achenes hirsutulous. *S. serotina salebrosa* Piper. Along streams: B.C.—*Mont.*—Ore. *Submont.* Jl-Au.

17. *S. polyphylla* Rydb. Stem tall, sometimes a meter high, strict, simple and puberulent up to the more hirsutulous inflorescence; leaves narrowly lanceolate, sessile, acuminate, serrate above the middle, thick and firm, green, scabrous above, more softly short-pubescent beneath; bracts linear, acute; achenes hispidulous. Perhaps not distinct from the eastern *S. altissima* L. Along streams: Wyo.—N.M. *Submont.* Au-S.

18. *S. canadensis* L. Stem 6-15 dm. high; leaves sessile, 5-10 dm. long, rarely 1.5 cm. wide, narrowly lanceolate, acuminate, serrate, puberulent on both sides or glabrous above; panicle large, broadly conic; bracts narrowly linear or lance-linear, acute or obtusish; achenes sparingly hairy. Among bushes: Lab.—W.Va.—Colo.—B.C. *Plain*—*Submont.* Jl-O.

19. *S. serpa* Rydb. Stem about 6 dm. high, more or less pubescent, especially above; leaves lanceolate, about 8 cm. long, acuminate, sharply toothed, rather thin; heads numerous 3-4 mm. high; bracts linear or linear-lanceolate, acute; achenes hirsutulous. Along streams: Colo.—Wyo. *Mont.* Au.

20. *S. dumetorum* Lunell. Stem 5-10 dm. high, densely puberulent; leaves lanceolate, acute, thick, more or less serrate, strongly veined, revolute

and scabrous-ciliolate on the margins, densely hispidulous-puberulent beneath; inflorescence short-conic; involucre about 3 mm. high; bracts linear-acute; achenes sparingly hispidulous. *S. scabriuscula* Rydb., in part. Dry soil: Sask.—Mo.—Tex.—Mont. *Plain.* Jl-S.

21. *S. pruinosa* Greene. Stem about 1 m. high; leaves ascending, about 5 cm. long, elliptic-lanceolate, acute or acuminate, lightly but evenly serrate, 3-ribbed, canescent on both sides, with a dense and soft pubescence; inflorescence short-pyramidal; outer bracts linear-subulate, the inner oblong, lance-obtuse. Plains. Sask. *Plain.* Au.

22. *S. gilvocanescens* (Rydb.) Smyth. Stem slender, 3-6 dm. high, puberulent; leaves 3-6 cm. long, sparingly serrate or entire, puberulent-canescant; inflorescence small and dense; heads 3-4 mm. high; bracts narrowly linear, acute; achenes sparingly hairy. Sandy soil: Minn.—Kans.—Utah—Mont. *Plain.* Jl-Au.

23. *S. Garrettii* Rydb. Stem 2-3 dm. high, sparingly puberulent or glabrous; leaves obovate-spatulate or the upper oval, entire or the lower toothed towards the apex, rather thin, minutely and sparingly scabrous-puberulent, scabrous-ciliolate, 3-6 cm. long; inflorescence more or less leafy, with a few secund branches; heads 5-6 mm. high; bracts lanceolate, acute, yellowish; achenes sparingly hirsute. Canions: Utah—Wyo. *Submont.* Au.

24. *S. nana* Nutt. Stem finely canescent-puberulent, 1-2 dm. (rarely 3 dm.) high; basal leaves 2-6 cm. long, petioled, canescent-puberulent, spatulate, rounded at the apex, entire or crenulate; stem-leaves oblanceolate; heads 5-7 mm. high; achenes strigose. High dry plains: Mont.—Colo.—Ariz. *Submont.* —Mont. Jl-S.

25. *S. nivea* Rydb. Stem 1-2 dm. high, canescent-puberulent; basal leaves 2-4 cm. long, short-petioled, obovate-spatulate, rounded at the apex, entire or nearly so, canescent-puberulent, almost velvety and almost white; stem-leaves oblanceolate; heads about 6 mm. high; achenes hirsute-strigose. Dry hillsides: Mont. *Submont.* Jl-Au.

26. *S. pulcherrima* A. Nels. Stem 3-8 dm. high, striate, cinereous-puberulent; lower leaves narrowly oblanceolate, entire, 6-12 cm. long; upper leaves oblong or linear; all cinereous-puberulent; heads about 6 mm. high; achenes puberulent. *S. diffusa* A. Nels. Dry plains: Sask.—Minn.—Neb.—Colo.—Ariz.—Alta. *Plain—Mont.* Jl-S.

27. *S. radulina* Rydb. Stem 3-4 dm. high, grayish-puberulent; lower leaves obtuse, crenate at the apex, finely puberulent; heads about 4 mm. high; bracts oblong, obtuse, or the inner linear; achenes hirsutulous. Mountains: Utah—Colo. *Submont.* Au.

28. *S. trinervata* Greene. Stem decumbent at the base, cinereous-puberulent, 3-6 dm. high; leaves oblanceolate, 5-10 cm. long, puberulent, scabrous-ciliolate on the margins, entire or nearly so; heads about 6 mm. high; achenes hispidulous. Plains and hills: S.D.—N.M.—Ariz.—Utah. *Submont.—Mont.* Jl-S.

29. *S. mollis* Bartl. Stem 2-4 dm. high, cinereous-puberulent, strict, leafy; leaves obovate, oval, or broadly spatulate, or the upper elliptic, canescent, the lower more or less serrate; panicle usually dense and somewhat leafy; heads 5-7 mm. high; achenes sparingly hirsutulous. *S. nemoralis incana* A. Gray. Dry plains: Sask.—Tex.—Colo.—Mont. *Plain—Submont.* Jl-S.

30. *S. Wardii* Britton. Stem 4-10 dm. high, puberulent; leaves lanceolate or ovate-lanceolate, entire or with a few teeth, firm, 5-9 cm. long, pale, usually shining, scabrous-puberulent; panicle narrow, leafy; heads about 8 mm. high; bracts lanceolate, acute, canescent, squarrose. Plains and prairies: Mo.—Ark.—Okla.—w Neb. *Plain.* Au-O.

26. PETRADORIA Greene. ROCK GOLDENROD.

Low tufted perennial herbs, with a short branched caudex. Leaves alternate, entire, 3-nerved and punctate. Heads small, several, corymbose. Involucres cylindraceous; bracts in more or less distinct rows, rigid, somewhat carinate,

12. *T. scapigera* D. C. Eat. Cespitose, almost acaulescent perennial; leaves 2-4 cm. long, sparingly strigose; blades spatulate; stem 2-5 cm. high, scapiform; involucre about 10-15 mm. wide; bracts oblong-lanceolate, in 3 series, acute, strigose on the back, with rather narrow, pinkish, scarious, erose margins; ligules bluish purple, about 1 cm. long; pappus of both ray- and disk-flowers of many bristles. High mountains: Mont.—Wyo.—Calif. *Submont.*—*Mont.* My-Jl.

13. *T. incana* Nutt. Cespitose perennial; stems 1-10 cm. high, canescent-hirsute; leaves linear-oblancoate, canescent-strigose, 2-3 cm. long; heads sessile; involucre 8 mm. high, about 1 cm. wide; bracts lanceolate, acute, densely strigose, scarious and erose on the margins; ligules lilac, 8 mm. long. Mountains and hills: Wyo.—N.M.—Ariz.—Utah. *Son.*—*Subalp.* My-Je.

14. *T. arizonica* A. Gray. Cespitose perennial, tufted; stems 3-8 cm. long, sericeous-canescens; leaves spatulate, 1-2 cm. long, long-petioled; involucre 10-12 mm. broad; bracts lanceolate, obtuse, strigose on the back, scarious and erose-ciliate on the margins; ligules 5-8 mm. long; pappus of all the flowers of the same length, rather rigid, about as long as the achenes. Hills: Utah—Ariz. *Son.*

15. *T. glabella* A. Gray. Cespitose perennial; stems 2-5 cm. high, sparingly strigose; leaves spatulate, 2-3 cm. long; involucre 10-12 mm. broad; bracts lanceolate, in 2 or 3 series, acute, green, only slightly scarious-margined, ciliate; pappus of the ray-flowers about one-fourth as long as that of the disk-flowers or less. *T. Bakeri* Greene. Mountains: Colo. *Subalp.*—*Mont.* My-Jl.

16. *T. Rothrockii* A. Gray. Acaulescent pulvinate perennial; leaves spatulate, 2-3 mm. long, rosulate; involucre 8 mm. high, 1-2 cm. broad; bracts oblong, obtuse, glabrous, purple-tinged, scarcely scarious-margined, ciliate. High mountains: Colo. *Submont.*—*Mont.* Jl.

17. *T. Wilcoxiana* Wood. Cespitose acaulescent perennial; leaves narrowly linear-oblancoate, 3-7 cm. long, glabrous above, sparingly pubescent beneath; involucre 1.5-3 cm. broad; bracts acute, lanceolate, tinged with purple, scarcely scarious-margined; ligules 10-15 mm. long. Plains and hills: Okla.—Colo. *Plain.* Ap-Je.

18. *T. intermedia* Rydb. Acaulescent cespitose perennial; leaves oblanceolate, mostly acute; involucre 1.5-3 cm. broad; bracts narrowly lanceolate, in 4 or 5 series. Dry soil: Neb.—Kans.—Ariz.—Wyo. *Plain.* Ap-My.

19. *T. leptotes* (A. Gray) Osterh. Cespitose perennial, mostly acaulescent; leaves linear-oblancoate, sparingly strigose; heads mostly sessile; involucre 1 cm. broad; bracts linear, rounded on the back, ciliate on the margins, but not scarious. *T. sericea leptotes* A. Gray. Mountains: Colo. Je.

20. *T. exscapa* (Richards.) Porter. Cespitose acaulescent perennial; leaves sericeous-strigose, 2-5 cm. long; involucre 1 cm. high, 1-3 cm. broad; bracts narrowly lanceolate, in 4 or 5 series; achenes hirsute; pappus-bristles of the disk-flowers twice as long as the achenes, those of the ray-flowers often shorter. *T. sericea* Hook. *T. mensana* M. E. Jones. Plains: Sask.—Tex.—N.M.—Alta. *Plain*—*Mont* Ap-Je.

21. *T. spathulata* Nutt. Cespitose, acaulescent, multicapital perennial; leaves crowded, spatulate, densely villous-lanate; heads sessile; involucre 8 mm. high; bracts oblong-lanceolate, acute; rays short, pinkish; pappus of the ray- and disk-flowers similar, of many bristles. High mountains: Wyo.

31. BRACHYACTIS Ledeb.

Leafy-stemmed annuals, with entire leaves. Heads rather small, numerous, paniculate. Involucre campanulate; bracts in 2-3 series, linear or oblong, almost equal in length, the outer foliaceous and loose. Ray-flowers in several series, more numerous than the disk-flowers, white, shorter than the pappus, with short or no ligule. Disk-flowers perfect, with slender, 4-5-toothed corollas. Style-branches with lanceolate appendages. Achenes narrow, not compressed, 2-3-nerved, appressed-pubescent.

Bracts oblong or oblong-linear, obtuse.
Bracts narrowly linear, acute.

1. *B. frondosa*.
2. *B. angusta*.

1. *B. frondosa* (Nutt.) A. Gray. Annual; stem 2-5 dm. high, glabrous or nearly so; leaves linear or lance-linear, 3-8 cm. long, glabrous, ciliolate on the margins; involucre about 8 mm. high, fully 1 cm. broad; bracts in 3 distinct series; ligules about 2 mm. long, pinkish. *Aster frondosus* T. & G. Saline soil and along streams: Wyo.—Colo.—Calif.—Ore. *Plain*. Au-O.

2. *B. angusta* (Lindl.) Britton. Annual; stems erect, branched, glabrous, 2-6 dm. high; leaves narrowly linear, 3-10 cm. long, glabrous, slightly ciliolate on the margins; involucre 6-8 mm. high, 8-10 mm. broad; bracts in 2 series, almost equal; ray-flowers reduced to the tube or with rudimentary ligules. *A. angustus* T. & G. Saline ground: Sask.—Wis.—Mo.—Utah—Alta. *Plain*—*Son.* Jl-S.

32. *EREMIASTRUM* A. Gray.

Dwarf, depressed winter annuals. Leaves entire. Heads solitary. Involucres hemispheric or broader; bracts numerous, linear, nearly in a single series, herbaceous, with hyaline-scarious fimbriate margins; receptacle flat. Ray-flowers numerous, in a single series, pistillate; ligules white. Disk-flowers numerous, perfect and fertile. Achenes obovate-oblong, compressed, 2-nerved. Pappus of very unequal bristles, the outer setulose and scarcely longer than the pubescence of the achenes.

1. *E. bellioides* A. Gray. Winter annual; stem diffusely branched at the base; branches decumbent, 3-10 cm. long, hispid; leaves linear-spatulate, entire, 5-15 mm. long, hispid; heads subtended by rosulate leaves; involucre 5-6 mm. high, 8-10 mm. broad; bracts linear-lanceolate, hispid; ligules white or violet, about 5 mm. long, dentate at the apex. Deserts: s Utah—Ariz.—Calif. *L. Son.* Ap-Je.

33. *LEUCOSYRIS* Greene. SPINY ASTER.

Rush-like spiny plants, often woody at the base, with small linear or subulate, often deciduous leaves. Involucres hemispheric; bracts well imbricate, in 3 series, subulate. Ray-flowers pistillate and fertile, with short white ligules. Disk-flowers perfect; corollas yellow. Style-branches with triangular-subulate appendages, much shorter than the stigmatic portion. Achenes glabrous.

1. *L. spinosa* (A. Gray) Greene. Perennial, usually shrubby at the base; stems 1-2.5 m. high, usually more or less spiny, striate, glabrous; cauline leaves linear or oblong, deciduous; involucre 5-6 mm. high, about 8 mm. broad; bracts subulate, in about 3 series, scarious-margined, shorter than the disk; ligules white, 3-4 mm. long; achenes glabrous. *Aster spinosus* A. Gray. Banks of streams: Tex.—s Utah—Calif.; Mex. *L. Son.* Je-S.

34. *XYLORRHIZA* Nutt. HOLLY-LEAVED ASTER.

Perennial caulescent herbs, with thick woody taproots and short caudices. Leaves many, spinulose-tipped, entire or spinulose-toothed. Heads large, solitary at the ends of the branches, radiate. Involucres hemispheric; bracts mostly in 2 or 3 series, acuminate, herbaceous, carinate below. Ray-flowers pistillate; ligules showy, white or pinkish. Disk-flowers perfect. Appendages of the style-branches lanceolate, acute. Achenes oblong, compressed. Pappus fulvous, simple, of rather few coarse bristles.

Leaves not spinulose-toothed.

Glabrous or nearly so.

More or less villous.

Bracts only slightly unequal, linear-lanceolate

Leaves linear-oblancoolate, acute.

Leaves spatulate, cuspidate.

Bracts very unequal, the outer ovate or ovate-lanceolate.

Leaves spinulose-toothed.

Plant 1 dm. or less high, with a short caudex.

Ligules 8-10 mm. long.

Ligules 15-20 mm. long.

Plant tall, shrubby.

1. *X. glabriuscula*.

2. *X. villosa*.

3. *X. venusta*.

4. *X. Parryi*

5. *X. coloradensis*.

6. *X. Brandegei*

7. *X. lanceolata*

1. *X. glabriuscula* Nutt. Stems 1-2 dm. high, glabrous; leaves linear-ob lanceolate, 2-5 cm. long, glabrous; involucre 8-10 mm. high, 10-15 mm. wide; bracts linear-lanceolate, acuminate, glabrous, erose on the margins; ligule rose-colored, 10-12 mm. long. Alkali plains: Wyo. Je-Jl.

2. *X. villosa* Nutt. Stems 1-2 dm. high; leaves 2-5 cm. long, or linear-ob lanceolate, villous, tipped with a callous point; involucre 8-10 mm. high, 10-15 mm. broad; bracts linear-lanceolate, attenuate at the apex, villous on the back, erose on the margins; ligules pale red, 8-12 mm. long. *Aster Xylorrhiza* T. & G. Rocky places and clayey soil: Colo.—Wyo. My-Je.

3. *X. venusta* (M. E. Jones) Heller. Stems 2-5 dm. high; leaves entire, spatulate or oblanceolate, villous, 4-6 cm. long, spinulose-tipped; involucre about 1.5 cm. high, 3 cm. broad; bracts linear-lanceolate, attenuate, villous on the back, scarcely erose; ligules white or purple, 15-20 mm. long. *A. venustus* M. E. Jones. Dry places: Colo.—Utah. Son. My-Je.

4. *X. Parryi* (A. Gray) Greene. Stems tomentose-villous, about 1 dm. high; leaves spatulate, obtuse with a callous point, 2-3 cm. long, villous; involucre 8 mm. high, 15-18 mm. broad; bracts well imbricate, villous on the back, erose on the margins; rays about 1 cm. long, white. *A. Parryi* A. Gray. Flats: Wyo. Son.

5. *X. coloradensis* (A. Gray) Rydb. Stems less than 1 dm. high, canescent; leaves spatulate or oblanceolate, 2-4 cm. long, spinulose-dentate, hirsute-canescant; involucre about 8 mm. high, 15 mm. broad; bracts lance-subulate, attenuate, canescent; ligules 8-10 mm. long, violet-purple. *A. coloradensis* A. Gray. Higher mountains: Colo. Alp.

6. *X. Brandegei* Rydb. Stem almost 1 dm. high; leaves spatulate or the upper oblanceolate, 3-4 cm. long, firm, closely and sharply serrate with bristle-tipped teeth; disk about 3 cm. wide; bracts narrowly linear-lanceolate, attenuate; rays rose-purple. High mountains: s Colo. Subalp.—Alp. S.

7. *X. lanceolata* Rydb. Shrubby perennial, with white stems; branches more or less villous; leaves 4-6 cm. long, more or less villous, reticulately veined, dentate with spinulose-subulate teeth; involucre fully 1 cm. high, 15-20 mm. broad; bracts lance-subulate, villous and slightly glandular, attenuate and spinulose-tipped; ligules purple, about 2 cm. long. Arid places: s Utah. L. Son.

35. HERRICKIA Woot. & Standl.

Perennial herbs, with thick rigid, spinulose-toothed, reticulate, sessile leaves. Heads solitary at the ends of the branches, subsessile. Involucre turbinate-campanulate; bracts in several series, conspicuously keeled, green and foliaceous above, with callous points, the outer more foliaceous and passing into the leaves; receptacle naked. Ligules purple. Disk-flowers perfect; corollas yellow, turning purplish, with short ovate lobes. Style-branches with lanceolate, acute tips. Achenes compressed, striate, glabrous. Pappus simple, of long barbellate bristles.

1. *H. horrida* Woot. & Standl. Stems 3 dm. high or less, hirsute-glandular; leaves rigid, oblong to broadly ovate or oval, 2-4.5 cm. long, sessile or somewhat cordate-clasping, reticulate, spinose-dentate, pubescent; ligules 8 mm. long. Mountains: N.M.—s Colo. Au.

36. UNAMIA Greene. SNEEZEWORT ASTER.

Perennial, caulescent herbs with horizontal rootstocks. Leaves alternate, narrow, entire. Heads rather small, corymbose, radiate. Involucre turbinate-campanulate; bracts narrow, not foliaceous, more or less keeled. Ray-flowers pistillate; ligules white or ochroleucous. Disk-flowers yellow, perfect, numerous. Appendages of the style-branches lanceolate-subulate. Achenes 4-5-angled, not compressed, glabrous. Pappus of white rigid bristles, somewhat clavate at the ends.

Inner bracts ovate-lanceolate, acute, the outer lance-subulate, ligules white.

1. *U. alba*.
Inner bracts oblong or elliptic, obtuse or rounded at the apex; ligules yellowish, the outer lanceolate, obtusish.
2. *U. lutescens*.

1. *U. alba* (Nutt.) Rydb. Stems 2-5 dm. high, smooth, scabrous, or hispidulous; lower leaves linear-ob lanceolate, 3-5-ribbed, 5-15 mm. long, firm, the upper linear; involucre about 5 mm. high, 5-8 mm. broad; ligules 5-6 mm. long. *Inula alba* Nutt. *Aster plarimicoides* T. & G. Rocky banks and bluffs: Vt.—N.Y.—Colo.—Sask. Plain—Submont. Jl-S.

2. *U. lutescens* (Lindl.) Rydb. Stem 2-4 dm. high, scabrous, at least above; leaves similar to those of the preceding species; involucre 5-6 mm. high, 6-8 mm. broad; ligules about 8 mm. long. *Diplopappus lutescens* Lindl. *Aster plarimicoides lutescens* A. Gray. Banks and plains: Ill.—Wis.—Sask. Plain. Au-S.

37. EUCÉPHALUS Nutt.

Caulescent leafy perennials, with rootstocks. Leaves alternate, sessile, from ovate to linear. Heads corymbose, radiate, middle-sized. Involucres campanulate; bracts regularly imbricate in several series, ovate to lanceolate, not foliaceous or in one species with foliaceous tips, dry and chartaceous with a distinct keel or midrib. Ray-flowers pistillate; ligules violet or purplish. Disk-flowers numerous, perfect; corollas yellow. Style appendages subulate, acute, or rarely oblong and obtuse. Achenes flat, hirsute or glabrate in age. Pappus of white capillary bristles.

Bracts all thin and acute, villous-ciliate on the margins; style-appendages subulate
Leaves ovate-oblong or broadly lanceolate; heads 10-15 mm. high 1. *E. Engelmannii*.
Leaves lanceolate, heads 8-10 mm. high 2. *E. elegans*
Bracts firmer, merely ciliate, the outer obtuse.
Bracts with more or less foliaceous tips; involucre and branches of inflorescence decidedly glandular, the leaves less so. 3. *E. wasatchensis*
Bracts without foliaceous tips; plant not glandular or very rarely so. 4. *E. glaucus*
Inner bracts acute. 5. *E. formosus*.
All bracts obtuse or rounded and mucronate at the apex.

1. *E. Engelmannii* (D. C. Eat.) Greene. Stem robust, 5-15 dm. high, glabrous or slightly puberulent; leaves thin, 5-10 cm. long, loosely veined; involucre hemispheric; bracts ovate, acute or acuminate, purple-tinged, in 5 series, puberulent on the back and ciliate on the margins; ligules white, fully 1 cm. long. *Aster Engelmannii* D. C. Eat. Mountains: Alta.—Colo.—Nev.—Wash.—B.C. Submont.—Mont. Jl-S.

2. *E. elegans* Nutt. Stem 3-10 dm. high, leafy, puberulent; leaves pale, lanceolate, 3-5 cm. long, scabrous-puberulent; involucre campanulate; bracts ovate, acute, purple-tinged, puberulent on the back, villous-ciliate on the margins; ligules about 8 mm. long, white. *Aster elegans* T. & G. Woody mountain slopes: Mont.—Wyo.—Utah—Neb.—Ore. Submont.—Mont. Jl-S.

3. *E. wasatchensis* (M. E. Jones) Rydb. Perennial with a rootstock; stem glabrous up to the inflorescence; leaves lance-oblong, acute, sessile, 4-6 cm. long, rather pale, glandular-puberulent; involucre 10-12 mm. broad; bracts lanceolate, acute; rays fully 1 cm. long. *A. glaucus wasatchensis* M. E. Jones. Mountains: Utah. Mont. Au.

4. *E. glaucus* Nutt. Stem branched, glabrous, 3-5 dm. high; leaves glabrous, glaucous, lanceolate, linear or oblong, acute, 3-7 cm. long, reticulate-venose; involucre about 6 mm. high and 8 mm. broad; bract ovate, glabrous, slightly ciliate on the margins; ligules violet or white, 8-10 mm. long. *A. glaucus* T. & G. Mountains: Wyo.—Colo.—Utah. Submont.—Mont. Jl-S.

5. *E. formosus* Greene. Stem glabrous, 3-5 dm. high; leaves linear, glaucous, glabrous, scabrous on the margins; involucre about 6 mm. high and 8 mm. broad; bracts ovate or oval, strongly purple-tinged, minutely ciliate; ligules deep blue, about 1 cm. long. Mountains: Colo. Mont. Au.

38. ÁSTER (Tourn.) L. ÁSTER.

Perennial herbs, usually with a rootstock, rarely with a woody caudex. Leaves alternate, various. Heads corymbose, paniculate, racemose, or rarely solitary, radiate. Involucres hemispheric or campanulate, or turbinate; bracts imbricate in several series, herbaceous or with herbaceous tips; receptacle flat or

convex, alveolate and often fimbriate. Ray-flowers pistillate; ligules purple, pink, or white. Disk-flowers perfect; corollas tubular with a bell-shaped throat and short 5-lobed limb, yellow, changing into red, brown, or purplish. Anthers obtuse at the base. Style-branches flattened, their appendages subulate, lanceolate, or ovate, acute. Achenes more or less flattened, nerved, or ribbed, glabrous or pubescent. Pappus of numerous, slender, white bristles in a single series.

Involucres and peduncles glandular.

Leaves ovate, oval, or the lower obovate, sharply and coarsely serrate; bracts well imbricate, very unequal, broadly lanceolate, not thick. I. CONSPICUI.

Leaves lanceolate, oblong, or linear, entire or, if slightly toothed, bracts linear-lanceolate, almost equal in length.

Lower leaves petioled.

Stems stout, 3-5 dm. high, leafy; bracts lanceolate, firm, ascending.

Stem-leaves lanceolate to ovate; disk of heads 1.5-2 cm. broad.

Stem-leaves narrowly linear, disk of heads about 1 cm. broad. II. INTEGRIFOLII.

Stem low, slender, few-leaved, 0.5-2 dm. high; bracts narrowly linear-lanceolate, with reflexed tips. III. PAUCIFLORI.

Leaves all sessile. Bracts narrowly linear, almost equal in length, attenuate. IV. KINGIANI.

Leaves broadly lanceolate or oblong.

Leaves linear.

Bracts thick, oblanceolate, well imbricate; leaves oblong or lanceolate. V. MODESTI.

VI. CAMPESTRES.

VII. OBLONGIFOLII.

Involucres and peduncles not glandular.

Outer bracts neither foliaceous nor equalling or surpassing the inner.

Bracts more or less pubescent on the back.

Bracts not bristle-pointed.

Heads solitary, plant less than 3 dm. high, leaves oblanceolate or the upper linear. VIII. ALPINI.

Heads corymbose or paniculate; plant over 3 dm. high.

Upper leaves more or less clasping and auricled at the base. IX. MOLLES.

Upper leaves neither auricled nor clasping.

Leaves obovate, broadly oblanceolate, oval or lanceolate, usually more or less toothed, bracts lanceolate, often tinged with purple. X. RADULINI.

Leaves narrowly oblanceolate or linear, entire; bracts linear or oblanceolate, green-tipped.

Pubescence villous.

Pubescence hirsute or strigose.

Bracts bristle-pointed, squarrose.

Bracts glabrous, except the ciliate margins.

Bracts linear, oblong or lanceolate, all acute or acutish.

Lower leaves long-petioled, blades cordate or ovate (rarely broadly lanceolate), usually more or less serrate. XIV. SAGITTIFOLII.

Lower leaves oblanceolate, linear, or lanceolate.

Plants perfectly glabrous throughout.

Bracts whitish-coriaceous below and with a distinctly rhombic green tip above; upper leaves clasping. XV. LAEVES.

Bracts linear-subulate, green nearly throughout; leaves narrowly linear, not clasping. XVI. PORTERIANI.

Upper part of the stem and peduncles with at least pubescent lines.

Heads usually numerous in a leafy panicle or compound corymb.

Stem only with pubescent lines. XVII. SALICIFOLII.

Stem, at least above, pubescent on all sides.

Heads few in a naked small corymb. XVIII. LONCHOPHYLLI.

Bracts oblanceolate, the outer obtuse. XIX. OCCIDENTALES.

Outer bracts foliaceous, equalling or surpassing the inner.

Heads rather numerous in an open leafy panicle. XXI. FULCRATI.

Heads few, in a usually simple, racemose, or corymbose inflorescence with nearly erect branches. XXII. FOLIOSI.

One species.

I. CONSPICUI.

1. *A. conspicuus*.

Stem almost glabrous below, auricles of the thinnish leaves small, bracts narrowly linear, lanceolate. II. INTEGRIFOLII.

Stem hirsute-villous throughout; auricles of the thick leaves broad; bracts oblong or lanceolate. III. PAUCIFLORI.

One species.

III. PAUCIFLORI.

4. *A. pauciflorus*.

One species.

IV. KINGIANI.

5. *A. Kingii*.

V. MODESTI.

Stem not hispid; beads distinctly peduncled, leaves slightly if at all auricled at the base, thin.

Stem, especially upwards, with scattered long silky hairs, leaves not auricled, usually somewhat hairy. 6. *A. major*.

Stem glandular-puberulent or glabrous below, not long-hairy.

Leaves and lower part of the stem glabrous, the former not auricled.

Leaves short-pubescent, somewhat scabrous above, stem usually puberulent throughout, leaves with small auricles 7. *A. modestus*.

Stem short-hispid, beads crowded, often subsessile, subtended by bract-like leaves; leaves thick, strongly auricled at the base. 8. *A. Sayianus*.

Leaves thick, strongly auricled at the base. 9. *A. Norae-Angliae*.

VI. CAMPESTRES.

One species.

10. *A. campestris*

VII. OBLONGIFOLII

Leaves scabrous-hirsutulous, mostly spreading or reflexed

11. *A. Kumleini*

Leaves glabrous, except the bristly-ciliate margins, ascending.

12. *A. Fendleri*

VIII. ALPINI.

One species.

13. *A. alpinus*

IX. MOLLES.

One species.

14. *A. Jessicae*.

X. RADULINI.

Upper part of the stem and the involucre long-villous.

15. *A. Richardsonii*.

Upper part of the stem and involucre short-pubescent.

16. *A. mentus*

XI. ANDINI.

Stems decumbent or ascending, about 1 dm. high; leaves glabrate

17. *A. andinus*

Stems erect, about 3 dm. high; leaves finely villous.

18. *A. Williamsii*.

XII. GRISII.

Leaves rather copiously and permanently appressed-hirsutulous.

Inflorescence falsely racemose, lower leaves triple-nerved. 40. *A. subracemosus*.

Inflorescence corymbiform or paniculate, leaves all 1-nerved.

Plant 3-4 dm. high; stem retrorse-hirsute below

19. *A. subgriseus*.

Plant 1-1.5 dm. high; hairs of the stem not retrorse.

20. *A. griseolus*

Leaves sparingly strigose and glabrate in age, or perfectly glabrous, except the hispidulous-ciliate margins.

Bracts with a green tip and midvein

Stem stout; leaves oblanceolate, the lower often triple-nerved.

61. *A. Underwoodii*.

Stem slender, leaves narrowly linear-oblanceolate or linear, 1-nerved

64. *A. Nelsonii*

Outer bracts green almost throughout.

21. *A. violaceus*

XIII. MULTIFLORI

Inflorescence very leafy, not corymbiform

Pubescence of the stem spreading or reflexed, hirsutulous

Heads less than 5 mm. high.

22. *A. exiguus*

Heads 6-8 mm. high

23. *A. crassulus*.

Pubescence of the stem appressed or ascending

Bracts very unlike in length, well imbricate, the outer much shorter, heads racemously arranged, each at the end of a short leafy branch (except in no. 25)

Bracts narrowly oblanceolate, the inner especially acutish, heads less than 5 mm. high

Stem much branched, heads racemously disposed on the more or less diverging branches

Stem simple below, heads few at the ends of the erect branches

24. *A. multiflorus*.

Bracts broadly oblanceolate or the outer spatulate, very obtuse; heads over 5 mm. high.

25. *A. stricticaulis*

Bracts almost equal in length or the outer sometimes longer, heads few or solitary at the ends of the main branches

26. *A. polycephalus*.

Bracts thick, very squarrose, the outer spatulate, rounded at the apex; leaves thick, densely strigose

27. *A. commutatus*.

Bracts thin, slightly squarrose, oblanceolate, acute, leaves sparingly strigose, in age often glabrate

28. *A. falcatus*

Inflorescence less leafy, corymbiform; leaves glabrous, merely hispid-ciliate; disk 6-8 mm. wide; stem slender.

Stem glabrous

29. *A. denudatus*

Stem puberulent.

67. *A. Hallii*.

XIV. SAGITTIFOLII.

Basal leaf-blades cordate or broadly ovate; upper stem-leaves lanceolate; achenes glabrous.

Petioles, midribs, and usually also the stem pubescent with long white hairs.

30. *A. Wilsonii*.

- Plant glabrous or sparingly short-pubescent. 31. *A. Lindleyanus*
 Basal leaf-blades lanceolate; upper stem-leaves narrowly lanceolate or those of the inflorescence lance-linear.
 Heads few; involucre 8-9 mm. high; rays about 15 mm. long; achenes glabrous. 32. *A. MacCallae*.
 Heads numerous; involucre 5-6 mm. high; rays 8-10 mm. long; achenes hispidulous-strigose. 33. *A. Butleri*.

XV. LAEVES.

- Bracts much shorter than the disk. 34. *A. brevibracteatus*.
 Bracts about equalling the disk or only slightly shorter.
 Leaves merely scabrous-ciliate 35. *A. laevis*.
 Green tips of the bracts broadly rhombic; leaves of the branches much reduced.
 Green tips of the bracts narrowly rhombic or rhombic-ob lanceolate; leaves of the branches gradually but not conspicuously reduced.
 Stem-leaves lanceolate or linear-lanceolate, auricled-clasping. 36. *A. Geyeri*.
 Stem-leaves narrowly linear, not auricled. 37. *A. subsalignus*.
 Leaves decidedly long-ciliate; bracts with oblong green tips. 38. *A. Scribneri*.

XVI. PORTERIANI.

- One species. 39. *A. Porteri*

XVII. SALICIFOLII

- Inflorescence falsely racemose, leaves linear to oblanceolate; leaves triple-nerved 40. *A. subracemosus*.
 Inflorescence paniculate or corymbiform; leaves not triple-nerved
 Inflorescence elongate, not flat-topped
 Heads numerous in a much branched panicle, involucre well imbricate
 Leaves distinctly toothed.
 Disk of the head about 1 cm. high and broad, leaves thickish 41. *A. salicifolius*.
 Disk 6-8 mm. high and broad; leaves thin. 42. *A. paniculatus*.
 Leaves entire, rarely denticulate, with more or less clasping bases.
 Disk of the head nearly 1 cm. high and broad
 Bracts linear-elliform, more or less squarrose. 43. *A. hesperius*
 Bracts linear, erect. 44. *A. fluitatilis*
 Ligules purple.
 Ligules white or sometimes pinkish
 Bracts not with white midrib, leaves narrowly linear. 45. *A. Osterhoutii*
 Bracts with white midrib; leaves lanceolate or oblong-lanceolate 46. *A. laetivirens*.
 Disk of the head 6-8 mm. high and broad
 Bracts linear, nearly of the same length; leaves narrowly linear. 47. *A. longulus*.
 Bracts oblong or linear-oblong, the outer shorter; leaves broadly linear. 48. *A. roseolus*.
 Heads rather few, often solitary on the leafy branches, bracts narrowly linear, nearly of the same length, the outer green. 49. *A. Franklinianus*.
 Inflorescence more or less flat-topped
 Leaves lanceolate to linear-lanceolate, firm; heads numerous
 Leaves narrowly linear, thin; heads few. 50. *A. corymbiformis*.
 51. *A. junceiformis*.

XVIII. LONCHOPHYLLI.

- Stem softly pubescent; leaves lanceolate, not pale
 Stem crisp-puberulent above; upper stem-leaves linear, sessile, but scarcely auricled. 52. *A. lonchophyllus*.
 Stem villous above; upper stem-leaves oblong-lanceolate, auriculate-clasping. 53. *A. eriocalis*.
 Stem hispidulous above; leaves linear, pale green. 54. *A. leucopsis*.

XIX. OCCIDENTALES.

- Bracts linear-subulate, acuminate, the inner almost caudate.
 Leaves linear-ob lanceolate, acuminate, or the upper linear-lanceolate. 55. *A. subcaudatus*.
 Leaves linear 49. *A. Franklinianus*.
 Bracts linear, acute; lower leaves oblanceolate, the upper lanceolate, acute, usually auriculate-clasping
 Disk about 1 cm. broad, stem-leaves linear or lance-linear; basal-leaves linear-ob lanceolate, bracts distinctly imbricate in 3-4 series. 56. *A. occidentalis*.
 Disk 1.5 cm. or more wide; leaves lanceolate or oblanceolate, entire; bracts in about 2 series.
 Bracts, at least the outer ones, wholly green; plant 2-4 dm. high. 57. *A. Fremontii*.
 Bracts with more or less distinct white margins below, green-tipped above.
 Bracts with conspicuous rhombic-lanceolate green tips; dark green stem-leaves oblanceolate, all except the uppermost crenate and petioled; rays dark blue. 58. *A. Umbachii*.

and slightly clasping, those of the branchlets only 3-5 mm. long; heads numerous, borne at the end of leafy branchlets; involucre turbinate, 5-8 mm. high, 8-10 mm. broad; ligules numerous, white, 5-7 mm. long. *A. hebecladus* Coult. & Nels., not DC. *A. multiflorus* A. Gray, in part. Plains: Sask.—N.D.—Colo.—Calif.—Ida. *Plain—Submont.* Jl-O.

24. *A. multiflorus* Ait. Stem much branched, 3-6 dm. high; branches mostly ascending-spreading; leaves linear, 1-5 cm. long, sparingly hirsute-strigillose, or above glabrate; involucre about 4 mm. high and broad; ligules white, 3-4 mm. long. Prairies and dry ground: Me.—Ga.—Mex.—Colo.—B.C. *Plain.* Au-O.

25. *A. stricticaulis* (T. & G.) Rydb. Stem 3-6 dm. high, slender; leaves narrowly linear, 1-5 cm. long, 1-2 mm. wide, sparingly strigose or glabrate; involucre 3-4 mm. high and nearly as broad; bracts in 3 series, narrowly oblanceolate, almost glabrous, rather thin; ligules white, 3 mm. long. Meadows and river valleys: Sask.—Neb.—Wash.—Alta. *Plain.* Au-S.

26. *A. polycephalus* Rydb. Stem with many ascending branches, 3-8 dm. high; leaves linear, 2-5 cm. long, hispidulous-strigose or in age glabrate; involucre 5-7 mm. high and as broad; ligules white, 4-6 mm. long. Plains and hills: Alta.—Neb.—Tex.—Ariz. *Plain—Submont.* Jl-S.

27. *A. commutatus* T. & G. Stem branched above, with usually spreading branches, coarsely strigose; leaves linear, 1-4 cm. long, densely hispid-strigose; involucre 6-8 mm. high and fully as wide; ligules white, 4-5 mm. long. *A. adsurgens* Greene. *A. ucanoplosus* Sheld. Plains and river banks: Sask.—Minn.—Kaus.—N.M.—Ariz.—B.C. *Plain—Submont.* Au.

28. *A. falcatus* Lindl. Stem 3-4 dm. high, sparingly strigose; leaves linear, often falcate, 2-4 cm. long; heads more racemously arranged than in the preceding; involucre 5-6 mm. high and as broad; ligules white or pinkish, 4-5 mm. long. *A. Cordneri* A. Nels. Valleys. Mack.—Colo.—Alaska. *Plain—Mont.* Jl-O.

29. *A. denudatus* Nutt. Stem 2-4 dm. high, glabrous or nearly so throughout, slender; leaves narrowly linear, 1-5 cm. long, the upper much reduced, rather firm; involucre 5-6 mm. high; outer bracts oblanceolate, rounded at the apex, the inner linear and more acute, all glabrous; ligules 5-8 mm. long. Dry plains: Utah—s Ida. *Son.* Jl-Au.

30. *A. Wilsonii* Rydb. Stem 3-6 dm. high, often purplish, more or less pubescent with long white hairs; lower leaf-blades 5-10 cm. long, usually more or less hirsute on both sides, but in age glabrate, serrate, acuminate, the upper lanceolate, sessile, sub-entire; involucre 7-8 mm. high, scarcely 1 cm. wide; bracts subulate, attenuate, with green oblanceolate midrib; ligules 8-10 mm. long, bluish purple. River valleys: Mack.—B.C.—w Ont. *Boreal.* Au-S.

31. *A. Lindleyanus* T. & G. Stem 3-10 dm. high, with crisp hairy lines above; lower leaf-blades cordate to ovate, serrate, 5-15 cm. long, rather firm; middle leaves with winged ciliate petioles with clasping bases; the uppermost leaves lanceolate, sessile; involucre 7-8 mm. high, about 1 cm. broad; bracts linear-subulate, with a green oblanceolate midrib; disk-flowers reddish purple; ligules bluish purple, 10-12 mm. long. River banks: Lab.—N.H.—Ohio—Wyo.—B.C.—Yukon. *Plain—Subalp.*

32. *A. MacCallae* Rydb. Stems 3-6 dm. high, often purplish, glabrous up to the inflorescence, then slightly pubescent in lines; lower leaves with winged petioles; blades 8-15 cm. long, usually serrate, acute, glabrous or essentially so; involucre 8-9 mm. high, 1 cm. broad; bracts subulate, glabrous, with linear-lanceolate green tips; ligules blue or bluish purple, about 15 mm. long; disk-flowers red-purple. Along streams: Alta.—B.C. *Mont.* Au-S.

33. *A. Butleri* Rydb. Stem 4-10 dm. high, slender; lower leaf-blades about 1 dm. long, distantly serrate; involucre 5-6 mm. high, about 8 mm. wide; bracts subulate, with narrowly lanceolate green tips, attenuate, glabrous; ligules bluish purple, 8-10 mm. long. Along streams: Alta.—Mont.—B.C. *Mont.* Au-S.

34. *A. brevibracteatus* Rydb. Stem 5-6 dm. high, glabrous, tinged with purple; basal leaves about 1 dm. long, with short winged petioles; blades spatulate or oblanceolate, crenate-serrate, glabrous; upper stem-leaves lanceolate, half clasping; involucre 5-7 mm. high, nearly 1 cm. broad; bracts linear-lanceolate, firm, with a narrowly rhomboid green tip; ligules blue, 8 mm. long. Low ground: Wash.—Mont. *Submont.* Au-S.

35. *A. laevis* L. Stem 3-12 dm. high, rigid, glabrous, glaucous; basal leaves with winged petioles; blades ovate or lanceolate, more or less serrate, glabrous and glaucous; upper stem-leaves ovate, subcordate or auriculate-clasping; involucre 8-9 mm. high, about 1 cm. broad; ligules blue. Open woodlands: Ont.—La.—N.M.—B.C. *Plain—Mont.* Au-O.

36. *A. Geyeri* (A. Gray) Howell. Stem 5-10 dm. high, glabrous; lower leaves 1-2 dm. long, with winged petioles; blades oblanceolate, entire or sparingly serrate, glabrous, glaucous; involucre about 8 mm. high and 1 cm. wide; ligules blue, 8-10 mm. long; achenes glabrous. Valleys: Alta.—S.D.—Colo.—Wash. *Submont.—Mont.* Jl-S.

37. *A. subaalignus* Rydb. Stem 6-10 dm. high; leaves nearly erect, glabrous, glaucous, entire, clasping, 5-10 cm. long, 6-7 mm. wide; involucre about 7 mm. high and 8 mm. wide; ligules bluish or bluish purple, about 8 mm. long; disk-flowers dark, red-purple. Valleys: Colo. *Submont.* Au.

38. *A. Scribneri* Rydb. Stem 3-6 dm. high, glabrous; basal leaves 1-2 dm. long, with wing-margined petioles; blades thin, ovate, acute, sharply serrate-dentate, glaucous, glabrous; stem-leaves ovate or ovate-lanceolate, sessile and clasping; panicle small, with 5-10 heads; bracts glabrous; ligules about 8 mm. long. Valleys: Mont. *Submont.* Au.

39. *A. Porteri* A. Gray. Stems 2-4 dm. high, glabrous, simple or branched above; leaves linear, or the lower oblanceolate, 5-10 cm. long, divergent, glabrous, or the lower hirsute-ciliate; heads numerous; involucre 4-5 mm. high, 6-7 mm. broad; ligules white, 5-6 mm. long. Mountains: Colo. *Submont.—Mont.* Jl-O.

40. *A. subracemosus* Rydb. Stem 5-6 dm. high, simple, strict, sparingly strigose; leaves oblanceolate or the upper linear, sessile, 4-8 cm. long, more or less scabrous, scabrous-ciliate on the margins, entire; involucre about 8 mm. high and 1 cm. broad; bracts in 3-4 series, with oblanceolate green tips. Rocky hillsides: Mont. *Submont.* S.

41. *A. salicifolius* Lam. Stem 5-20 dm. high, paniculately branched; leaves lanceolate, firm, glabrous or scabrous, 6-10 cm. long, the lower more or less dentate; involucre 6-8 mm. high, 8-10 mm. broad; bracts with narrowly oblanceolate green tips or the outer nearly wholly green; ligules purple or violet, rarely white, 6-8 mm. long. Wooded banks: Me.—Fla.—Tex.—Colo.—B.C. *Plain—Submont.* Au-O.

42. *A. paniculatus* Lam. Stem 5-20 dm. high, paniculately branched; leaves oblong-lanceolate to narrowly linear-lanceolate, mostly attenuate, thin, glabrous, sharply denticulate or the upper entire; involucre 5-6 mm. high, 8-10 mm. wide; bracts with narrowly linear-lanceolate green tips; ligules white or rarely pink or pale lilac, 7-8 mm. long. Wooded banks: N.B.—Va.—Colo.—Sask. *Plain—Submont.* Au-O.

43. *A. hesperius* A. Gray. Stem 4-10 dm. high, paniculately branched; leaves lance-linear, entire or rarely denticulate, 5-15 cm. long, thin, glabrous or nearly so, hispid-ciliate on the margins; involucre 7-8 mm. high, nearly 1 cm. broad; outer bracts green, the inner ones with narrowly lanceolate green tips, of the same length or the outer slightly shorter; ligules violet or white, 7-8 mm. long. Along streams: N.M.—Colo.—Calif.; n Mex. *Son.* Au-O.

44. *A. fluviatilis* Osterh. Stem slender, 6-10 dm. high, leafy and branched; leaves lance-linear, sessile, somewhat clasping, the larger 1 dm. long, entire or nearly so; inflorescence paniculate; involucre 6-7 mm. high, nearly 1 cm. broad; bracts in 4 series, oblanceolate, acute, with oblanceolate green tips; ligules lilac to purple. *A. coerulescens* Rydb. (Fl. Colo.), not DC. Along streams: Wyo.—Utah—Colo.—Ia. *Plain—Submont.* S.

45. *A. Osterhoutii* Rydb. Stem branched and leafy, 5-10 dm. high; leaves 5-12 cm. long, 8 mm. wide or less, those of the branches much smaller; involucre 7-8 mm.; bracts linear to oblanceolate, apiculate; ligules white or rarely pinkish, nearly 1 cm. long. Along ditches and streams: Colo.—Sask.—Alta. *Plain.* Au-S.

46. *A. laetivirens* Greene. Stem erect, 3-6 dm. high, red or purplish; leaves lanceolate or oblong-lanceolate, thin, light green, somewhat glaucescent; involucre 8 mm. high and about 1 cm. wide; ligules 8-10 mm. long, white or pinkish. Along streams: Colo.—Wyo.—Ida. *Submont.* Au-S.

47. *A. longulus* Sheld. Stem strict, branched above, 6-15 dm. high, hispid in lines; leaves narrowly linear, 3-10 cm. long, sessile, glabrous on both sides or scabrous above; inflorescence paniculate; involucre 4-5 mm. high, 6-7 mm. broad; bracts acute, the outer often wholly green; ligules 6 mm. long, white or lilac. Swampy ground: Sask.—Minn.—Neb.—Colo.—B.C. *Plain.* Jl-S.

48. *A. roseolus* Rydb. Stem 3-5 dm. high, often purple-tinged; leaves linear, glabrous or nearly so, 5-10 cm. long, 5-12 mm. wide; involucre about 5 mm. high, 8-9 mm. broad; bracts often wholly green, with broadly lanceolate tips; rays rose-colored, 5-6 mm. long. Meadows: Mont. *Submont.* Au.

49. *A. Franklinianus* Rydb. A perennial, with a horizontal rootstock; stems 4-10 dm. high, simple; leaves narrowly linear, entire, scarcely clasping, rather firm, dark green, glabrous, 7-15 cm. long, less than 1 cm. wide; involucre 8 mm. high, fully 1 cm. broad; bracts linear, attenuate; ligules purple, 8-10 mm. long. *A. sahccifolius* Richards, not Lam. Wet meadows: Sask.—Mont.—Ida.—Mack. *Boreal—Mont.*

50. *A. corymbiformis* Rydb. Stem strict, about 3 dm. high, branched above; leaves linear, 5-8 mm. long, half-clasping; inflorescence leafy, corymbiform; involucre 6 mm. high, 8 mm. broad; bracts linear-lanceolate, with an oblanceolate green tip; ligules white or purplish, about 7 mm. long. Meadows: Colo. *Submont.* Au.

51. *A. junciformis* Rydb. Stem slender, 3-5 dm. high, simple below; leaves narrowly linear, 4-8 cm. long, 2-4 mm. wide; involucre about 6 mm. high, about 1 cm. broad; the inner bracts linear, acute, with green lanceolate tips, the outer oblong or oblanceolate, obtuse, often almost wholly green; ligules white, 6-8 mm. long. Meadows and swamps: Sask.—Wis.—Colo.—Wash.—B.C. *Plain.*

52. *A. lonchophyllus* Greene. Stem erect, 4-6 dm. high, reddish-purple; leaves 5-10 cm. long, narrowly lanceolate, acute, entire, sessile, firm, green and glabrous, 1-nerved; inflorescence paniculate; involucre about 7 mm. high and 1 cm. broad; bracts linear, acute, more or less tinged with purple; ligules rose-purple. Mountains: Colo. *Mont.* Au.

53. *A. eriocalis* Rydb. Stem about 8 dm. high, leafy, purplish; stem-leaves 3-7 cm. long, more or less auriculate-clasping; inflorescence a round-topped panicle; involucre 8 mm. high, 10-12 mm. broad; bracts linear, acute, more or less ciliate, the outermost almost wholly green; ligules purple, 8-10 mm. long. Mountain meadows: Ida. *Submont.* Au.

54. *A. leucopsis* Greene. Stem 3-6 dm. high, straw-colored, racemously paniculate above, hispidulous in the inflorescence, linear, 5-10 cm. long, 5-10 mm. wide, thick, pale green, strongly scabrous-ciliate on the margins; heads mostly solitary at the ends of the many short branches; involucre turbinate, about 8 mm. high and broad; bracts well imbricate, oblanceolate, with a narrowly rhombic green lip; ligules 8 mm. long, white or pale violet. Along ditches: Utah. *Son.* S.

55. *A. subcaudatus* Rydb. A perennial, with a creeping rootstock; stem 3-6 dm. high, more or less purple; lower leaves 1-2 dm. long, 4-10 cm. wide, often sparingly dentate with ascending sharp teeth, dark green; upper leaves sessile; panicle open, with rather few heads; involucre 7-8 mm. high, about 12 mm. broad; bracts only slightly white-margined below; rays purple, about 1 cm. long. Mountain meadows: Alta.—Wyo.—Ida.—B.C. *Submont.—Mont.* Je-Au.

56. *A. occidentalis* Nutt. Stem strict, 2–10 dm. high; lower leaves 1–2 dm. long, linear-lanceolate, entire or few-toothed, dark green; upper leaves lance-linear or linear, those of the corymbiform inflorescence much reduced; involucre 5–7 mm. high, 10–12 mm. broad; ligules 6–8 mm. long. Mountain meadows and plains: Ida.—Colo.—Calif.—B.C.—Yukon. *Plain*—*Mont.* Jl–S.

57. *A. Fremontii* (T. & G.) A. Gray. Stem 2–4 dm. high; lower leaves petioled, 3–10 cm. long, dark green, oblanceolate or spatulate, entire; upper leaves oblong-lanceolate or nearly linear, sessile and somewhat clasping; involucre 7–8 mm. high, about 1 cm. broad; bracts linear, acute or obtusish, the outer wholly green; ligules purple, 7–10 mm. long. Mountain valleys: Alta.—Colo.—Utah—B.C. *Mont.*—*Subalp.* Jl–Au.

58. *A. Umbachii* Rydb. Stem slender, erect, simple, 3–5 dm. high; lower leaves about 1 dm. long, petioled, broadly oblanceolate or lanceolate, dark green, more or less crenate, acute; middle stem-leaves similar but the petioles with dilated, clasping bases; upper stem-leaves lanceolate, sessile; involucre 8–9 mm. high, 12–15 mm. broad; bracts oblong-oblanceolate, acute; ligules dark bluish purple, fully 1 cm. long. River banks: *Mont.* *Mont.* Au.

59. *A. ciliomarginatus* Rydb. Stem 3–6 dm. high; lower leaves with wing-margined petioles, 1–2 dm. long, oblanceolate, acute; upper leaves lanceolate, sessile, more or less clasping; involucre 8–9 mm. high, 12–15 mm. broad; bracts linear or lance-linear, the outer rarely nearly wholly green; ligules light blue, 10–12 mm. long. *A. glashfolius* Greene. Along streams: *Mont.*—Colo.—Utah—B.C. *Submont.*—*Mont.* Jl–Au.

60. *A. armeriaefolius* Greene. Stem 2–3 dm. high, pubescent in lines above; lower leaves petioled, 5–10 cm. long, oblanceolate, entire, acute, deep green, glabrous, reticulate-venose; involucre 6–7 mm. high, about 1 cm. broad; bracts linear or linear-oblong, green or narrowly white-margined below; ligules violet or bluish purple, about 8 mm. long. Mountains: Colo.—Wyo.—Utah. *Mont.* Jl–Au.

61. *A. Underwoodii* Rydb. Stem 2–3 dm. high, often purplish, more or less hirsute-strigose; lower leaves spatulate or oblanceolate, tapering into a winged petiole; the other stem-leaves sessile and the uppermost linear-lanceolate; involucre about 8 mm. high and 1 cm. broad; bracts oblanceolate; ligules purple or bluish, about 1 cm. long. High mountains: Colo.—Wyo. *Mont.* Je–S.

62. *A. Tweedyi* Rydb. Stem simple, usually purplish, about 4 dm. high; leaves oblanceolate, acute, rather firm, often 1 dm. long, the lower with a winged petiole, the upper sessile and half clasping; heads about 1 cm. high; bracts linear or oblanceolate, not very unequal in length; ligules rose or purple, 8–10 mm. long. Valleys: Colo.—Alta. *Submont.* Jl–Au.

63. *A. adscendens* Lindl. Stem ascending or decumbent at the base, 2–8 dm. high, glabrous, slightly pubescent above; leaves firm and thick, the lower petioled, 6–12 cm. long, the upper linear, sessile; inflorescence paniculate; involucre 5–6 mm. high, nearly 1 cm. broad; bracts oblanceolate, with green tips, ligules bluish purple, 5–8 mm. long. *A. pratensis* Greene. (?) *A. oxyphyllus* Greene. Valleys: Sask.—Colo.—Nev.—Alta. *Submont.*—*Mont.* Jl–S.

64. *A. Nelsonii* Greene. Stem 3–6 dm. high, leafy, sparingly strigose; leaves linear, 5–7 cm. long, firm, entire, acute, 1-nerved; involucre about 8 mm. high, 10 mm. broad; bracts oblong or linear; ligules violet or lilac, 8 mm. long. *A. vallicola* Greene, a narrow-leaved form. Mountains: Colo.—Mont.—Wash.—Ore. *Submont.* Jl–S.

65. *A. Nuttallii* T. & G. Stem 2–6 dm. high, glabrous or sparingly pubescent, especially above; basal leaves linear-oblanceolate, somewhat glaucous, glabrous; stem-leaves narrowly linear; inflorescence paniculate; involucre 5–6 mm. high, less than 1 cm. broad; bracts oblanceolate, green-tipped; ligules bluish purple, 6–8 mm. long. *A. orthophyllus* Greene. Mountains: Neb.—Colo.—Utah. *Submont.* Jl–Au.

66. *A. halophilus* Greene. Stem about 3 dm. high, sparingly hirsutulous-strigose, especially above; stem-leaves linear, 5–8 cm. long, glabrous, except the

hispidulous-ciliate margins, deflexed, firm; leaves of the floral branches less than 1 cm. long, spreading and becoming bract-like above; involucre turbinate, 7-8 mm. wide; bracts imbricate, coriaceous below, with green obovate or spatulate green tips, the outer rounded at the apex; ligules pale, 5 mm. long. Salt marshes: Utah. *Son.* S.

67. *A. Hallii* A. Gray. Stem strict, 2-5 dm. high; lower leaves linear, the upper linear-oblong, 2-5 cm. long, those of the branches much smaller, all entire; involucre 3-4 mm. high, 4-7 mm. broad; bracts imbricate, rather thick, spatulate or oblanceolate, rounded and callous, mucronate at the apex; ligules 4-6 mm. long, white or whitish. Dry places: Wash.—Mont.—Ore. *Submont.*—Mont. S.

68. *A. proximus* Greene. Stem 4-6 dm. high, glabrous below, sparingly pubescent above; leaves linear-lanceolate or lanceolate, entire, sessile, 5-10 cm. long, smooth beneath, scabrous above, light green, spreading; disk about 9 mm. high, 10-15 mm. broad; outer bracts obtuse, mucronate; ligules flesh-colored or rose, 8-10 mm. long. River banks: Wyo.—Mont. *Submont.*—Mont. Au-S.

69. *A. phyllodes* Rydb. Stem 5-10 dm. high, leafy, glabrous below, pubescent in lines above; leaves thin, the lower usually more or less serrate, with small distant teeth, all glabrous on both sides, auriculate-clasping; disk 8 mm. high, about 12 mm. broad; outer bracts oblanceolate, acute, foliaceous, usually slightly exceeding the disk; rays violet, 8-10 mm. long. Meadows: w Neb.—e Colo. *Plain.* Au.

70. *A. Mearnsii* Rydb. Stem 3-10 dm. high, leafy, branched, glabrous below, sparingly pubescent above; leaves 5-10 cm. long, ascending-spreading, sessile, entire, glabrous beneath, scabrous or glabrate above; disk about 8 mm. high and barely 1 cm. broad; bracts oblanceolate, acute, some longer than the disk; ligules about 8 mm. long, white or pinkish. River banks: Sask.—Wyo.—Ida.—B.C. *Submont.*—Mont. JI-O.

71. *A. Douglasii* Lindl. Stem 4-10 dm. high, glabrous and shining below, pilose above; leaves linear-lanceolate or linear, 5-15 cm. long, glabrous or nearly so; involucre 8-10 mm. high, about 15 mm. wide; bracts linear, acute or acuminate, with often squarrose tips, the outer scarcely longer than the inner; ligules light blue, 10-12 mm. long. Moist places: Mont.—Wyo.—n Calif.—B.C. *Submont.* Au-S.

72. *A. fulcratus* Greene. Stem decumbent at the base, red-purple, more or less puberulent, 3-4 dm. high; leaves linear, 5-10 cm. long, entire, glabrous, scabrous-ciliate; disk about 1 cm. high and broad; bracts in about 2 series, mostly green, the outer foliaceous, linear, 1-2 cm. long; ligules about 1 cm. long, rose-purple or rose-lilac. Valleys: Colo. *Mont.* JI.

73. *A. cordalenus* Henders. Stem erect, 2-3 dm. high, pubescent above; leaves 5-8 cm. long, 5-10 mm. wide, entire or with a few distant serratures, strongly ciliate; disk 5-7 mm. high and 7-10 mm. broad; outer bracts linear, 1-2 cm. long, green, the inner with white margins and foliaceous tips; ligules blue or violet, 8-10 mm. long. Moist river bars: Ida. *Submont.* Au.

74. *A. Eatonii* (A. Gray) Howell. Stem 3-10 dm. high, glabrous; leaves narrowly linear or lance-linear, sessile, thin, entire; involucre about 7 mm. high, 7-10 mm. broad; bracts glabrous, linear or lance-linear, acute; ligules 7-10 mm. long, lavender, rose, or whitish. *Brachyactis hybrida* Greene. Mountains: Mont.—Colo.—Nev.—B.C. *Submont.*

75. *A. Hendersonii* Fernald. Stem 5-10 dm. high, villous especially above, branched above; leaves thin, ciliate on the margins, more or less short-hairy or in age glabrate; stem-leaves linear-lanceolate, 5-8 cm. long, the lower ones 1-1.5 cm. long, narrowed below, with clasping bases; involucre turbinate, 10-15 mm. broad; bracts linear, subulate, foliaceous, ciliate on the margins; ligules blue, 12-16 mm. long. Rich meadows: Ida. *Submont.* JI-Au.

76. *A. oreganus* Nutt. Stem slender, branched, 3-6 dm. high, more or less pubescent; branches strongly ascending; leaves linear or lance-linear, 5-8 cm. long, entire, 6-8 mm. high, 7-8 mm. broad; bracts lanceolate or lance-linear, the outer about equalling the inner ones; ligules purplish or white, 7-8 mm. long.

Banks of streams and wet meadows: Mont.—Utah—Nev.—Ore.—B.C. *Submont.*—*Mont.* JI-S.

77. *A. microlonchus* Greene. Stem 5-8 dm. high, glabrous, or pubescent in lines, branched; leaves narrowly lance-linear, 5-8 cm. long, entire, sessile, thin, spreading and sometimes reflexed; involucre 7-8 mm. high, 10-15 mm. broad; bracts linear, acute, glabrous, the outer slightly longer than the inner; ligules pale violet or lilac, 7-8 mm. long. Valleys: B.C.—Mont. *Submont.* Au.

78. *A. Kootenayi* Nels. & Macbr. Stem villous, 8-10 dm. high, branched above; leaves oblanceolate, acuminate, often sharply serrate, clasping with auricled bases, 5-15 cm. long; disk fully 1 cm. high, 15-20 mm. broad; bracts numerous, linear-subulate, attenuate, green, sparingly villous, longer than the disk; ligules 10-12 mm. long, bluish purple. *A. foliaceus Lyallii* A. Gray. River valleys: Ida.—Wash. JI.

79. *A. Forwoodii* S. Wats. Stem 4-6 dm. high, rough-hispid, strict; leaves sessile, obovate, oblanceolate or lanceolate, narrowed to a broad auriculate base, hirsute on the veins beneath, 5-10 cm. long, serrate, or the upper entire; inflorescence corymbose-paniculate; disk 10-12 mm. high, 12-15 mm. broad; bracts linear, short-acuminate, equalling the disk; ligules 10-12 mm. long. Mountains: S.D.—N.D. *Submont.* Au.

80. *A. amplius* Lindl. Stem stout, about 1 m. high; leaves thin, the lower oblanceolate, 1-1.5 dm. long; blades tapering below into a winged petiole, the upper sessile, lanceolate, clasping; bracts glabrous, linear or narrowly linear-oblanceolate, about equalling the disk; ligules 12-13 mm. long. Mountains: [Canadian] "Rocky Mountains." *Mont.*

81. *A. diabolicus* Piper. Stem erect, 5-10 dm. high, leafy; leaves thin, narrowly oblanceolate, or the upper linear-lanceolate, entire or nearly so, the basal 10-15 cm. long, with winged petiole, stem-leaves 3-10 cm. long, sessile, somewhat clasping; disk about 1 cm. high, 10-12 mm. wide; bracts green, linear or linear-lanceolate, barely equalling the disk; ligules violet, 10-14 mm. long. *A. foliaceus* Coult., in part. Wet places: Ore.—Mont.—Alta.—B.C. *Mont.* JI-Au.

82. *A. frondeus* (A. Gray) Greene. Stem 3-10 dm. high; leaves thin, the lower 1-2 dm. long, oblanceolate, entire, glabrous; middle stem-leaves oblanceolate, with clasping auriculate bases, the upper lanceolate and also clasping; disk about 1 cm. high, 15-20 mm. broad; bracts foliaceous, narrowly oblanceolate, equalling or sometimes exceeding the disk; ligules about 1 cm. long, broad. Mountains: Alta.—Colo.—Utah—B.C. *Submont.*—*Subalp.* JI-S.

83. *A. Canbyi* Vasey. Stem 3-6 dm. high; lower leaves petioled, 1-2 dm. long; blades broadly oblanceolate; upper stem-leaves oblanceolate, sessile; disk about 1 cm. high, 15-20 mm. broad; outer bracts scarcely equalling the disk; ligules red-purple or rose-colored. Mountains: N.M.—Wyo.—Ida. *Mont.*—*Subalp.* JI-Au.

84. *A. Cusickii* A. Gray. Stem 3-6 dm. high; lower leaves with winged petioles, 1-1.5 dm. long; blades oblanceolate, thin, entire or sparingly dentate; upper stem-leaves lance-oblong, with auriculate-clasping bases; disk about 1 cm. high and nearly 2 cm. broad; outer bracts exceeding the disk; ligules 10-14 mm. long. Mountain meadows and along streams: Ore.—Ida.—B.C. JI-S.

85. *A. Burkei* (A. Gray) Howell. Stem 3-6 dm. high, glabrous below, villous above; lower leaves petioled; blades oblanceolate, glabrous, scabrous on the margins; upper leaves elliptic or lanceolate, broadly clasping at the base; heads few; disk 10-12 mm. high, 2-2.5 cm. broad; ligules 10-12 mm. long. *A. foliaceus Burkei* A. Gray. *A. majusculus* Greene, a luxuriant form with several heads. Mountains: Wyo.—N.M.—Ariz.—Wash.—B.C. *Mont.* JI.

86. *A. apricus* (A. Gray) Rydb. Stem 1-2 dm. high, sparingly cinereous-pubescent; leaves oblong or oblanceolate, 2-5 cm. long, glabrous, scabrous on the margins; the uppermost clasping; disk about 1 cm. high, 12-15 mm. broad; bracts spatulate or oblanceolate, acutish, glabrous, softly ciliate on the margins; ligules purple. *A. foliaceus apricus* A. Gray. *A. incertus* A. Nels. (?) *A. dis-*

trichophyllus Greene. Alpine peaks: Mont.—Colo.—Ore.—B.C. Mont.—Subalp. Jl—Au.

39. OREOSTÉMA Greene.

Subcaulescent perennials. Leaves narrow, entire, subcoriaceous. Heads solitary, terminating the scapiform stems. Involucre hemispheric; bracts subequal, in 2-3 series, herbaceous. Rays pistillate, numerous; ligules purple. Disk-flowers perfect, fertile. Style-branches with subulate or lanceolate acute appendages. Achenes narrow, cylindric. Pappus of brittle, barbellate deciduous bristles. [*Oreastrum* Greene.]

1. **O. Haydeni** (Porter) Greene. Low perennial, with thick woody root and caudex; stem 1 dm. high or less, glabrous; basal leaves many, linear, 5-10 cm. long, 2-3 mm. wide, glabrous; stem-leaves shorter; head solitary; involucre about 1 cm. high, 10-12 mm. broad; bracts linear, glabrous, slightly tinged with purple, with narrow scarious, ciliolate margins; ligules blue, about 1 cm. long. *Aster pulchellus* A. Gray, in part, not Willd. *A. Haydeni* Porter. Mountain slopes: Mont.—Wyo.—Nev. Mont.—Subalp. Jl—S.

40. ASTERIGERON Rydb.

Low perennials, with caespitose rootstocks. Leaves alternate, the basal ones numerous, the cauline ones much reduced. Heads solitary, terminal, radiate. Involucres hemispheric; bracts imbricate in 3 series, those of the inner series broad, lanceolate, with reddish purple-tinged scarious margins, the rest linear. Ray-flowers pistillate; ligules purplish. Disk-flowers perfect, fertile. Style-branches with ovate or triangular, subulate-acuminate appendages. Achenes flat, appressed pubescent. Pappus of many hispidulous bristles. In general habit, involucre and fruit agreeing with *Erigeron*, but the style-tips more like those of *Aster*.

1. **A. Watsoni** (A. Gray) Rydb. Perennial, with a caespitose rootstock; stems slender, decumbent, 1 dm. long or less, glabrous or nearly so; basal leaves 2-3 cm. long, petioled, linear-spatulate, glabrous; stem-leaves very small, 4-10 mm. long; heads solitary, peduncled; involucre about 5 mm. high and 8 mm. broad; bracts oblong-lanceolate, acute, pruinose, and with some scattered hairs, with purplish membranous margins; ligules about 4 mm. long, white or purplish. *Aster Watsoni* A. Gray. Mountains: Nev.—Utah. Mont. Au.

41. DOELLINGERIA Nees. WHITE ASTER.

Perennial caulescent herbs, with rootstocks. Leaves alternate, ciliate, entire. Heads in corymbiform cymes, radiate. Involucres campanulate; bracts imbricate in 2-4 series, narrow, appressed, not herbaceous at the tips; receptacle pitted. Ray-flowers few or several, pistillate; ligules white. Disk-flowers perfect; corollas slender, expanded into a 5-lobed limb. Anthers obtuse at the base. Appendages of the style-branches subulate to ovate. Achenes slightly broader above. Pappus double, the outer of short bristles or squamellae, the inner of capillary bristles, usually clavellate at the apex, tawny.

1. **D. pubens** (A. Gray) Rydb. Stem 5-10 dm. high, finely puberulent; leaves lanceolate or ovate-lanceolate, 5-15 cm. long, entire, acute, green and scabrous above, pale and tomentulose beneath; involucre about 5 mm. high; bracts linear-lanceolate, slightly tomentulose; ligules white, 4 mm. long. *Aster umbellatus pubens* A. Gray. Meadows and open woods: Upper Mich.—Wis.—Neb.—Sask. Plain. Jl—S.

42. IONÁCTIS Greene.

Perennial caulescent plants, often ligneous at the base. Leaves alternate, narrow, entire. Heads radiate, solitary or corymbose. Involucres turbinate; bracts narrow, well imbricate, appressed, firm. Ray-flowers numerous; ligules violet. Disk-flowers perfect; corollas with campanulate throats. Style-branches with subulate appendages. Achenes pubescent, flat, with strong marginal nerves. Pappus double, the inner series of capillary bristles, the outer short, setulose.

barely mucronate; involucre 8-10 mm. broad; bracts with lanceolate, acute, scarcely spreading tips; ligules about 6 mm. long. *Aster parviflorus* A. Gray. Canions and arid places: N.M.—s Utah—Ariz. *Son.* Jl—Au.

2. *M. humilis* (A. Gray) Standl. Annual; stem erect, 1-3 dm. high, branched, glandular-puberulent; leaves once pinnatifid, glandular-puberulent; divisions oblanceolate or oblong, entire or toothed, spinulose-tipped; involucre 10-15 mm. broad; bracts linear, acute, glandular-puberulent; ligules rarely 1 cm. long. *A. canescens humilis* A. Gray. Plains: N.M.—Utah—Ariz. *Son.* My—O.

3. *M. tanacetifolia* (H.B.K.) Nees. Annual; stem branched, 1-4 dm. high, green, glandular-puberulent and somewhat villous; leaves once or twice pinnatifid, 1-4 cm. long, glandular-puberulent; divisions oblanceolate or linear, entire or toothed; involucre hemispheric, fully 1 cm. high, 15-20 mm. broad; bracts linear, attenuate, numerous; ligules 12-20 mm. long, blue-purple. *A. tanacetifolius* H.B.K. *M. coronopifolia* (Nutt.) A. Nels. Sandy soil, plains, and hills: Tex.—S.D.—Alta.—Ariz.; Mex. *Plain—Submont.* Je—O.

4. *M. Bigelovii* (A. Gray) Greene. Biennial; stem glandular-hirsute, 3-10 dm. high, robust; leaves oblong or lanceolate, thin, coarsely dentate, glandular-puberulent, the upper more or less clasping, the basal ones oblanceolate, petioled; involucre about 15 mm. high, 2-3 cm. broad; bracts glandular-puberulent; ligules about 1 cm. long. *A. Bigelovii* A. Gray. Plains and foothills: Colo.—N.M.—Ariz. *Submont.* S—O.

5. *M. varians* Greene. Biennial; stem erect, 6-10 dm. high, glandular-puberulent above; leaves lanceolate, 7-10 cm. long, sessile, more or less spinulose-serrate, glabrous or minutely puberulent; involucre hemispheric, 1 cm. high, 1.5-2 cm. broad; ligules 12-15 mm. long, purple. Plains and mountains: Colo.—N.M. *Submont.* Jl—S.

6. *M. aspera* Greene. Biennial; stem stout, 6-10 dm. high, glandular-hispid; lower leaves oblanceolate, petioled, the upper oblong-lanceolate, sessile, more or less clasping, spinulose-serrate, scabrous and glandular-pruinose; involucre about 1 cm. high, 1.5 cm. broad; ligules 8-10 mm. long, purple. Mountains: Colo. *Submont.—Mont.* Je—Au.

7. *M. viscosula* Rydb. Biennial, with a rosette of basal leaves; stems few, about 2 dm. high, viscid-puberulent; basal leaves oblanceolate, petioled, the upper similar or linear, but sessile, all saliently and coarsely toothed to nearly entire; heads about 1 cm. high; ligules reddish purple, 8-10 mm. long and fully 1 mm. wide. *M. viscosa* Greene, not *Dieteria viscosa* Nutt. Plains and mountains: Colo. *Submont.—Mont.* Jl—Au.

8. *M. Pattersonii* (A. Gray) Greene. Biennial, with a stout taproot; stem 1-2 dm. high, villous and glandular; basal leaves numerous, 4-6 cm. long, petioled, spatulate, toothed above, glabrous or nearly so; involucre fully 1 cm. high and nearly 2 cm. broad; bracts linear-attenuate, green except at the base, glandular-hispidulous; ligules 10-15 mm. long, purple. *A. Pattersonii* A. Gray. High mountains: Colo. *Mont.—Alp.* Jl—Au.

9. *M. sessiliflora* (Nutt.) Greene. Biennial, leafy, 3-5 dm. high; leaves linear, saliently toothed, 3-6 cm. long, scabrous-puberulent or nearly glabrous; involucre about 1 cm. high and 1.5 cm. broad; bracts subulate, canescent; ligules rose-purple. Hills and plains: Neb.—Wyo. *Plan.* Au—S.

10. *M. rubricaulis* Rydb. Biennial or perhaps perennial; stem erect or nearly so, simple below, branched above, 4-6 dm. high, usually tinged with red or purple; leaves entire or sparingly dentate, scabrous-ciliolate on the margins, the largest 8 cm. long, and 8 mm. wide; involucre 10-12 mm. high, 12-15 mm. in diameter; ligules numerous, dark blue, about 12 mm. long and 1 mm. wide. Table-lands and hills: Colo.—e Utah. *Submont.* Au—S.

11. *M. latifolia* A. Nels. Biennial or perhaps perennial; stem erect, 1.5-2.5 dm. high; lower leaves petioled, the upper sessile; blades spatulate or oblanceolate, mostly 3-nerved, puberulent, or nearly glabrous above; inflorescence corymbiform; involucre hemispheric, about 8 mm. high and 12 mm. broad; bracts

glandular-puberulent; ligules blue or bluish violet. *M. paniculata* A. Nels., a large form. Mountains: Utah. *Mont.* Au.

12. *M. canescens* (Pursh) A. Gray. Biennial; stem profusely branched, 1-4 dm. high; lower leaves spatulate or oblanceolate, slightly toothed; stem-leaves linear, rarely narrowly oblanceolate, usually entire; heads numerous in an open panicle; involucre 7-8 mm. high, about 1 cm. broad; ligules 8 mm. long, dark bluish purple. *A. canescens* Pursh. *M. magna* A. Nels., a robust form. Sterile ground and sandy banks: Sask.—Colo.—Calif.—B.C. *Plain*—*Son.* Jl-S.

13. *M. superba* A. Nels. Biennial; stem branched at the base; branches ascending or decumbent, 8-15 cm. long; lower leaves oblong-oblanceolate, 4-6 cm. long, petioled; stem-leaves entire or remotely denticulate; involucre about 8 mm. high, 1 cm. broad; ligules deep blue or purple, 8-10 mm. long. Sandy hillsides: Wyo. *Mont.* Au.

14. *M. angustifolia* Rydb. Biennial or perhaps perennial; stem about 1.5 dm. high, more or less tinged with purple; leaves linear, 2-5 cm. long and about 2 mm. wide, finely strigose-puberulent, sinuose-denticulate; involucre 7-9 mm. high and broad; bracts oblong-lanceolate, acute, tinged with red or purple, comparatively thin; ligules 5-7 mm. long, rose or light purple. *M. linearis* Rydb., not Greene. Sandy places: Wyo. *Mont.* Au.

15. *M. commixta* Greene. Biennial; stem branched at the base; leaves all spatulate, 3-6 cm. long, serrate, at least above the middle, 3-ribbed; heads corymbose, large, about 1 cm. high and 12-15 mm. broad; ligules purple, about 9 mm. long. Mountains: Utah. *Submont.*—*Mont.* Jl-Au.

16. *M. leptophylla* Rydb. Biennial, caespitose at the base; stem slender, simple, 3-5 dm. high; lower leaves petioled, 2-5 cm. long, finely cinereous-puberulent, in age sparingly so; blades spatulate or oblanceolate, thin; upper leaves linear-oblanceolate or linear; involucre turbinate, 8 mm. high, 8-10 mm. broad; ligules rose-purple, about 8 mm. long. Hills: Utah. *Submont.* Au.

17. *M. viscosa* (Nutt.) Greene. Biennial; stem 3-5 dm. high; lower leaves petioled, 4-7 cm. long, entire or somewhat toothed, oblanceolate; middle leaves narrower and sharply serrate; involucre 8 mm. high, 10-12 mm. broad; ligules purple, 8 mm. long. Hills, slopes, and plains: Mont.—Wyo.—Utah. *Plain*—*Mont.* Jc-S.

18. *M. pulverulenta* (Nutt.) Greene. Biennial; stem erect, 2-4 dm. high; leaves narrowly oblanceolate, or the upper linear, 2-5 cm. long, entire or sparingly denticulate; involucre 6-7 mm. high, 8-10 mm. broad, only slightly squarrose; ligules purple, 7-8 mm. long. (?) *M. subalpina* Greene. Dry plains: Mont.—Colo.—Utah—Ida. Au-O.

19. *M. divaricata* (Nutt.) Greene. Biennial; stem stout, about 3 dm. high; branches numerous, more or less spreading; involucre turbinate, about 8 mm. high, 10-12 mm. broad; ligules purple, nearly 1 cm. long. Hills and plains: Mont.—Wyo. *Plain*—*Submont.* Au-O.

20. *M. glabella* Greene. Biennial; stem 3-4 dm. high, glabrous; lower leaves petioled, narrowly oblanceolate, glabrous, entire or slightly denticulate; upper leaves narrowly linear; involucre turbinate, about 7 mm. high, 7-8 mm. wide; ligules bluish purple, about 8 mm. long. *M. pulverulenta vacans* A. Nels. Mountains: Colo. *Submont.*—*Mont.* Jl-S.

21. *M. ramosa* A. Nels. Biennial, branched at the base; stem ascending or spreading, 2-4 dm. high; leaves green, nearly glabrous, linear-oblanceolate or linear, the earlier sharply dentate; involucre hemispheric, about 7 mm. high and 1 cm. wide; bracts linear, acute or short-acuminate, glandular-puberulent; ligules purple, 8 mm. long. Mountains and plains: Wyo.—Colo. *Submont.*—*Mont.* Jl-S.

22. *M. Selbyi* Rydb. Biennial; stem often reddish, branched above; lower leaves linear-oblanceolate to oblanceolate, petioled, glabrous or rarely slightly puberulent, dentate; upper leaves linear; involucre hemispheric, 7-8 mm. high

and 1 cm. broad; bracts well imbricate; glandular green tips small, lanceolate. Canons and meadows: Colo. *Submont.*—*Mont.* S.

23. *M. spectabilis* Greene. Biennial; stems several, 2–3 dm. high, glabrous or nearly so; lower leaves oblanceolate, petioled, the upper linear and sessile; involucre turbinate, about 1 cm. high and 12 mm. broad; bracts linear, acuminate; tips almost as long as the chartaceous portion, glandular-puberulent; ligules violet, 1 cm. long. Mountains: Colo. *Mont.* Au.

24. *M. cichoriacea* Greene. Biennial; stem stout, 3–6 dm. high; leaves pale green, glabrous, lanceolate, sessile, 3–5 cm. long, runcinate-dentate; involucre turbinate, about 7 mm. high and broad; bracts linear, acute; tips short, glandular-puberulent; ligules about 6 mm. long, violet. Hills and mountains: Colo.—e Utah—N.M.—Ariz. *Son.*—*Submont.* Au.

25. *M. Fremontii* Rydb. Biennial, with thick taproot; stems several, 4–5 dm. high; basal leaves oblanceolate, petioled, glandular-hispid and scabrous, sharply dentate; upper leaves sessile, linear or lanceolate; heads over 1 cm. high; bracts linear-lanceolate, cinereous; ligules purple, 8–10 mm. long. River bottoms: Colo. Jl.

45. *ERIGERON* L. FLEABANE.

Annual, biennial, or perennial herbs, caulescent or almost scapose. Leaves alternate, entire, toothed, or lobed. Heads solitary, corymbose, or paniculate, radiate or rarely discoid. Involucre hemispheric or saucer-shaped; bracts in 1–2, rarely 3 series, sub-equal or slightly imbricate; receptacle flat, naked. Ray-flowers pistillate, white, pink, or purple, rarely ochroleucous or yellow, or wanting. Disk-flowers perfect with yellow corollas. Anthers entire and obtuse at the base. Stigmas flattened, with mostly obtuse appendages. Achenes usually flattened, 2-nerved, in a few species subterete and several-nerved. Pappus in a single series of capillary scabrous bristles, or sometimes with a series of shorter bristles outside. [*Wyomingia* A. Nels.]

Bracts of the involucre in 1–2 series of almost equal length, not thickened on the back. Rays inconspicuous, erect or ascending, usually involute and incurved, numerous, often inside them a series of rayless pistillate flowers, leaves entire.

I. ACRES

Rays conspicuous, spreading, flat; no rayless pistillate flowers inside

Plant without runners.

Perennials with rootstocks or woody caudices.

Leaves dissected or deeply cleft

Leaves entire or merely toothed.

III. COMPOSITI.

Stems low, less than 2 dm. high, scapiform, usually bearing only one head; stem-leaves usually reduced

Involucre and peduncles villous with many-celled hairs, bracts comparatively broad.

II. UNIFLORI.

Involucre and peduncles hirsute to glandular-puberulent or glabrate, not long-villous.

IV. RADICATI.

Stem leafy, 2–10 dm. high, if lower bearing several heads; stem-leaves ample.

Stems densely caespitose from a thick taproot; heads small, the disk rarely more than 1 cm. wide

Pappus double, stem hirsute

V. PUMILI.

Pappus simple; stems strigose

VI. DECUMBENTES

Stems usually solitary from the ends of distinct (sometimes branched) rootstocks, heads large, the disk more than 1 cm. wide

Bracts with loose tips, rays broad, pappus simple, lower leaves broadly oblanceolate, the upper often reduced

Bracts villous

VII. ELATIORES.

Bracts glandular-puberulent or glabrous

VIII. SALSUGINOSI.

Bracts appressed, except the very tips, rays narrow, pappus double; perennials with short rootstocks.

Upper stem-leaves ample, ovate to lanceolate, not much smaller than the lower, which are more or less distinctly 3-nerved; peduncles usually short, ascending.

IX. MACRANTHI.

Upper stem-leaves reduced, linear-lanceolate, none of the leaves 3-nerved, peduncles long and erect.

X. GLABELLI.

Annuals or biennials, or perennials by means of stolons and offsets.

Stem-leaves broad, cordate-clasping, perennials with offsets.

XI. PHILADELPHICI

- Stem-leaves not cordate-clasping
 Stems rather simple, with a few large heads; disks about 1 cm. broad or more. XII. ASPERI.
 Stems much branched, leafy, with numerous small heads; disk 6-9 mm wide
 Stems strigose or sparingly hirsute except at the base, or glabrous; pappus-bristles of the ray-flowers usually lacking; annuals. XIII. RAMOSI.
 Stems and leaves densely short-pubescent with spreading hairs; pappus-bristles of the ray-flowers present.
 Annuals, pappus scant and simple. XIV. BELLIDIASTRA.
 Biennials (rarely perennials); pappus double, the outer of short subulate squamellae. XV. DIVERGENTES.
 Plants at first with a scapiform naked peduncle, later producing runner-like branches. XVI. FLAGELLARES.
 Bracts of the involucre in 3-4 series, more or less imbricate, thickened on the back, the outer usually successively shorter; perennials with caespitose caudices.
 Rays bluish, purplish, or white.
 Achenes terete or nearly so, several-nerved. XVII. CANI
 Achenes flattened or quadrangular, 2-4-nerved.
 Leaves more or less distinctly triple-nerved. XVIII. CAESPITOSI
 Leaves not triple-nerved
 Plants low, 2 dm. or less high; basal leaf-blades from broadly oval to narrowly linear-oblancoolate, heads solitary to few
 Basal leaf-blades broadly oval or obovate. XIX. ASPERUGINEI.
 Leaves narrowly linear-oblancoolate
 Involucres glandular. XX. ARENARIOIDES.
 Involucres hirsute or strigose. XXI. LAETEVIRENTES.
 Plant taller, 3-4 dm. high; leaves filiform or narrowly linear.
 Leaves narrowly linear or linear-oblancoolate, achenes quadrangular, 4-nerved. XXII. TETRAPLEURI.
 Leaves filiform; achenes flat, 2-nerved. XXIII. FILIFOLII.
 Rays yellow or ochroleucous. XXIV. LUTEI.

I. ACRES.

- Bracts of the involucre linear, abruptly acute, never glandular. Inner rayless pistillate flowers rare; inflorescence strictly racemiform, with almost erect branches.
 Low, 1-2 dm. high, usually branched at the base, stem-leaves sessile, peduncles short, not exceeding the subtending leaves. 1. *E. minor*.
 Taller, 3-6 dm. high, simple, lower stem-leaves petioled; basal leaves oblanceolate, peduncles elongate. 2. *E. ionchophyllus*.
 Bracts of the involucre linear-subulate, long-attenuate, and except in *E. elatus* more or less glandular-puberulent; inflorescence inclined to be corymbiform or paniculate, branches ascending.
 Plant tall, 3-8 dm. high, apparently only biennial, heads numerous, corymbose.
 Bracts glandular-puberulent, rarely with a few hairs
 Base of the involucre merely glandular-puberulent; whole plant glabrous or the margins of the leaves sparingly ciliate, stem-leaves lanceolate. 3. *E. politus*.
 Base of the involucre sparingly hirsute; leaves hairy, at least on the margins and veins beneath; stem-leaves linear or linear-oblancoolate. 4. *E. droebachensis*.
 Bracts hirsute or both hirsute and glandular-puberulent.
 Bracts both glandular-puberulent and hirsute, leaves more or less hairy. 5. *E. yellowstonensis*.
 Bracts not glandular; leaves glabrous except the ciliate margins. 6. *E. elatus*.
 Plant low, 1-3 dm. high, perennial; heads few or solitary.
 Involucres not black-hairy.
 Involucres glandular and hirsute. 7. *E. fucundus*.
 Involucres villous, not glandular. 8. *E. alpinus*.
 Involucre black-hairy. 9. *E. unalaschkenensis*.

II. UNIFLORI.

- Ligules purple or white.
 Ligules 0.5 mm. or less wide, erect; plant usually less than 1 dm. high; leaves and stem decidedly villous. 9. *E. unalaschkenensis*.
 Ligules 1-1.5 mm. wide, spreading; plant about 1 dm. high, basal leaves glabrate, lower part of the stem strigose or glabrate.
 Involucres and peduncles with black-purple hairs. 10. *E. melanocephalus*.
 Involucres and peduncles white-hairy
 Basal leaves sparingly hairy or glabrate.
 Basal leaves spatulate, obtuse. 11. *E. simplex*.
 Basal leaves narrowly linear-lanceolate. 12. *E. Scribneri*.
 Basal leaves densely villous
 Stem 1-2 dm. high, leafy; basal leaves oblanceolate, often acutish
 Stem 5-6 cm. high, scapiform; basal leaves cuneate-spatulate, often 3-toothed. 12. *E. grandiflorus*.
 13. *E. lanatus*.
 14. *E. aureus*.
 Ligules yellow.

III. COMPOSITI.

Leaves divided into linear or spatulate divisions; plant with a caespitose caudex.

Leaves pinnately divided.

Heads radiate, leaf segments rather distant, peduncles 5-20 cm. long.

15. *E. pinnatisectus*.

Heads discoid; leaf segments crowded; peduncles 2-5 cm. long

16. *E. manicus*.

Leaves once to thrice ternately divided

Leaf-blades twice or thrice ternate

17. *E. compositus*

Leaf-blades cuneate, ternately or pedate-quinately cleft at the apex; divisions

spatulate.

Disk 10-15 mm. broad; bracts linear-subulate, scarcely scarious-margined;

18. *E. trifidus*.

lobes of the leaves spatulate

Disk 7-10 mm. broad, bracts linear-lanceolate, scarious-margined, lobes of

19. *E. pedatus*

the leaves linear.

Leaves flabelliform, lobed or twice 3-cleft at the apex; plant with a creeping rootstock

20. *E. flabellifolius*.

IV. RADICATI

Head radiate.

Involucre glandular-puberulent or glabrate, not hirsute

Stem and leaves glabrous or nearly so, involucre less than 12 mm. broad

Basal leaves linear-oblancoolate

21. *E. leuomerus*

Basal leaves spatulate

22. *E. spathulifolius*

Stem and leaves pubescent, involucre 12-15 mm. wide.

63. *E. viscidus*.

Stem and leaves hirsute

Stem strigose, leaves puberulent, especially on the margins.

23. *E. controrsus*

Involucre more or less hirsute or strigose, in some also slightly glandular-puberulent.

Leaves and stem glandular scabrous as well as hirsute.

24. *E. glandulosus*

Leaves and stem hirsute or strigose, rarely glandular

Stem 1 dm. or more high, appressed-pubescent; disk over 1 dm. high, branches

of the caudex or rootstock rather slender, often purplish.

Leaves narrowly linear-oblancoolate, 1-3 mm. wide, strigose

Involucral bracts with appressed pubescence, rays purple

25. *E. gracilis*.

Involucral bracts with spreading pubescence

26. *E. Engelmannii*.

Rays white; bracts narrowly linear

Rays usually purplish; bracts lance-linear

Leaves oblancoolate to linear-oblancoolate, 3-8 mm. wide, glabrous above,

27. *E. ursinus*

except the margins

Stem 4-7 cm. high; disk less than 1 cm. wide; caudex and its branches stout

and short, not purplish

Leaves linear-oblancoolate to spatulate

Stem with appressed hairs, or glabrate

Leaves and stem glabrous or nearly so; stem almost leafless

28. *E. Evermannii*

Leaves and stem distinctly strigose, the latter with several leaves.

29. *E. Peasei*.

Stem with more or less spreading hairs.

Stems decumbent or ascending, leaves spreading, either softly hairy

or glabrate in age

Pappus double; inner pappus of 10-12 bristles, 2 mm. long;

outer pappus of small squamellae; rays white

30. *E. radicans*

Pappus simple or nearly so, consisting of many bristles, 3 mm.

31. *E. velensis*

long; rays purple.

Stems and leaves almost erect, the latter coarsely hirsute

Basal leaves narrowly linear-oblancoolate, stem-leaves linear.

32. *E. nanus*

Basal leaves narrowly spatulate; stem-leaves oblancoolate

Leaves linear-filiform

38. *E. condensatus*

Heads discoid, leaves narrowly linear.

33. *E. nematophyllus*.

34. *E. Bloomeri*.

V. PUMILI.

Pubescence of rather long hairs; branches of the stem almost erect.

Heads radiate

Stems over 1 dm. high, when well developed, with more than one head each.

Ray-flowers white

Outer pappus of small inconspicuous bristles, plant copiously hairy.

35. *E. pumilus*

Outer pappus of broad squamellae, plant sparingly hairy.

36. *E. Brandegei*.

Ray-flowers blue or purplish, outer pappus conspicuous and squamellate.

37. *E. concinnus*.

Stems usually less than 1 dm. high and usually monocephalous

Leaves spatulate

38. *E. condensatus*.

Leaves narrowly linear-oblancoolate.

32. *E. nanus*

Heads discoid

39. *E. aphanactis*.

Pubescence very short; branches of the stems spreading.

72. *E. Wooltonii*.

VI DECUMBENTES.

- Leaves 1-nerved, linear-oblancoate; the lower usually obtusish 26 *E. Engelmannii*.
 Leaves 3-nerved, at least at the base, equally long-acuminate at both ends
 Pubescence of the leaves loose, hirsute and somewhat glandular-puberulent
 Pubescence of the leaves appressed-strigose. 40. *E. decumbens*.
 41. *E. microlonchus*.

VII. ELATORES.

- Bracts very densely villous, squarrose; leaves entire. 42. *E. elatior*.
 Bracts sparingly villous, leaves usually dentate
 Ligules white; bracts scarcely squarrose; stem sparingly pubescent. 43. *E. Coulteri*
 Ligules blue or purple; bracts squarrose, stem densely pubescent above. 44. *E. peregrinus*.

VIII SALSUGINOSI.

- Rootstock thick; leaves thickish, acute; bracts narrowly linear-lanceolate, with strongly spreading tips
 Peduncles mostly solitary, finely strigose; stem single from the rootstock. 45. *E. salsuginosus*.
 Peduncles usually more than one, scabrous; stems several from a caudex. 49. *E. eucephaloides*.
 Rootstock slender; leaves thin, with long mucronate tips; bracts narrowly linear-subulate, only slightly spreading. 46. *E. Howellii*.

IX. MACRANTHI.

- Basal leaf-blades broadly obovate-spatulate, often denticulate; stem-leaves distant, shorter than the internodes, not ciliate on the margins, bracts glandular-puberulent, seldom with a few hairs 47. *E. superbus*
 Basal leaf-blades oblanceolate, entire; stem-leaves usually longer than the internodes, usually ciliate on the margins.
 Bracts linear-subulate, glandular-puberulent, not at all hirsute, leaves glabrous
 Leaves linear-lanceolate, minutely cillolate.
 Leaves dark green; bracts not with loose tips. 48. *E. salicinus*.
 Leaves light green, bracts with spreading tips 49. *E. eucephaloides*.
 Leaves not dark green, dull, strongly hirsute-ciliate 50. *E. macranthus*.
 Bracts linear, more or less hirsute.
 Stem and leaves glabrous or nearly so; the latter ciliate only on the margin and the veins below; bracts glandular-puberulent and with scattered hairs. 51. *E. speciosus*.
 Stem and leaves hairy, bracts hirsute or both hirsute and glandular.
 Leaves hirsute
 Pubescence scant, that of the stem long, leaves linear-lanceolate
 Pubescence of the leaves and the involucre dense, that of the stem short.
 Plant tall, green; upper stem-leaves ovate or ovate-lanceolate, distinctly triple-nerved 52. *E. conspicuus*
 Plant low, caescent; upper stem-leaves lanceolate, scarcely triple-nerved 52. *E. subtrinervis*
 Leaves glandular-puberulent 54. *E. incanescens*.
 55. *E. Vreelandii*.

X GLABELLI.

- Involucre hirsute or strigose, not at all glandular 56. *E. glabellus*.
 Leaves glabrous, except the ciliate margins.
 Leaves more or less pubescent
 Pubescence loose and spreading. 57. *E. fruticetorum*.
 Pubescence appressed 58. *E. Earlei*.
 Involucres more or less glabrous, sometimes also hirsute.
 Leaves glabrous, except the ciliate margins
 Stem pubescent, especially above, only slightly glandular.
 Bracts narrowly linear-subulate, ligules usually bluish or pink.
 Involucre conspicuously hirsute as well as glandular; stem low, usually with a single head. 59. *E. rubicundus*.
 Involucre slightly if at all hirsute; stem 3 dm. high or more, usually with more than one head 60. *E. eximius*.
 Bracts lance-subulate, ligules white 43. *E. Coulteri*.
 Stem scarcely hairy, decidedly glandular above 61. *E. Smithii*.
 Leaves and stem more or less pubescent
 Involucres about 18 mm. broad; plant conspicuously long-hairy.
 Involucres about 15 mm. broad; plant less conspicuously hairy, more glandular. 62. *E. formosissimus*.
 63. *E. viscidus*.

XI. PHILADELPHICI.

- Basal leaves crenate or dentate, with broad rounded or ovate teeth; upper leaves lanceolate, acute, rays white or pink. 64. *E. philadelphicus*.
 Basal leaves dentate, with sharp, triangular, salient teeth; upper stem-leaves triangular-lanceolate, acuminate; rays rose-colored or purple. 65. *E. purpureus*.

XII. ASPERI.

- Pubescence short, usually not dense.
 Pubescence appressed or rarely spreading; hairs not with pustulate bases.

- Heads small, disk 1 cm. or less wide; ligules white; basal leaves linear-oblancoolate, entire 66 *E. asper*.
 Heads larger; disk 1-1.5 cm. wide; ligules blue or purple; basal leaves usually more or less toothed, oblanceolate 67. *E. oblanceolatus*.
 Pubescence spreading, hairs with pustulate bases; basal leaves narrowly oblanceolate, ligules white or rarely pale rose 68 *E. consobrinus*.
 Pubescence long, dense, spreading or reflexed. 69. *E. Drummondii*.

XIII. RAMOSI

- One species. 70. *E. ramosus*.

XIV. BELLIDIASTRA.

- One species. 71. *E. Bellidiastrum*.

XV. DIVERGENTES.

- Stem simple below; rays usually white 72. *E. Wooloni*.
 Stem branched at the base, rays usually purplish. 73. *E. divergens*

XVI. FLAGELLARES.

- Leaves and stems appressed-hairy. 74 *E. flagellaris*.
 Leaves and stem densely short-pubescent with spreading hairs
 Basal leaves oblanceolate, entire, or 3-lobed at the apex, leaves of the stolons linear, plant gray. 75. *E. commixtus*.
 Basal leaves obovate-spatulate, entire, or with several lateral lobes or teeth, leaves of the stolons oblanceolate; plant greener. 76 *E. nudiflorus*.

XVII. CANI.

- Disk of the heads fully 1 cm. high and about 1.5 cm. wide; basal leaves spatulate, obtuse. Leaves canescent. 77. *E. Wyomingia*.
 Leaves silvery white. 78. *E. argenteatus*.
 Disk of the heads 7-8 mm. high and about 1 cm. wide, basal leaves oblanceolate, mostly acutish. 79. *E. canus*.

XVIII. CAESPITOSI.

- Stem leafy; stem-leaves almost as broad as the basal ones.
 Lower leaves narrowly linear-oblancoolate, upper leaves narrowly linear; all acuto and coarsely hairy, rays usually lilac or purplish 80 *E. corymbosus*.
 Lower leaves oblanceolate or linear-spatulate, usually obtusish; stem-leaves linear or oblong, all densely canescent, rays usually white.
 Stem erect, about 3 dm. high, usually with several heads; stem-leaves linear. 81. *E. subcanescens*.
 Stem decumbent at the base, 1-2 dm. high, with 1-3 (seldom more) heads; stem-leaves oblong. 82 *E. caespitosus*.
 Plant not conspicuously glandular. 83. *E. nauseosus*.
 Plant conspicuously glandular
 Stem more or less naked above, decumbent at the base, stem-leaves at least the upper ones reduced.
 Stems about 2 dm. high; disk 10-12 mm. high and about 15 mm. wide 84. *E. nevadensis*.
 Stems about 1 dm. high; disks about 6 mm. high and less than 1 cm. wide 85. *E. Eatonii*

XIX. ASPERUGINEI

- Leaves with a spreading rough pubescence. 86. *E. asperugineus*.
 Leaves strictly appressed-clinoreous.
 Disk 10-15 mm. wide; leaves finely and densely hairy; involucre bracts strigose. 87. *E. Tweedyi*.
 Disk 5-10 mm. wide; leaves sparingly and coarsely hairy; involucre bracts hirsute and glandular-puberulent 88. *E. tener*.

XX. ARENARIOIDES.

- One species. 89. *E. arenarioides*

XXI. LAETEVIRENTES.

- Stems 1.5-2 dm. high, leafy
 Ligules blue or purple, scarcely more than 1 mm. wide. 90. *E. laetevirens*.
 Ligules white, 1.5-2 mm. wide. 91. *E. montanensis*.
 Stem 3-8 cm. high, scapiform, leafless or few-leaved.
 Pubescence of the stem appressed or ascending; stems decumbent at the base
 Leaves grayish strigose, in age glabrate, bracts hirsute.
 Bracts linear, acuminate; ligules mostly purple, 7-8 mm. long 92. *E. Scribneri*.
 Bracts lance-linear, acute; ligules mostly white. 30. *E. radicans*.
 Leaves and bracts silvery strigose 101. *E. pulvinatus*.
 Pubescence of the stem spreading, stems erect; leaves densely hirsute, ligules white 93. *E. Parryi*.

XXII. TETRAPLEURI.

- Ligules fully 1 cm. long, white; involucre about 1 cm. broad 94. *E. utahensis*.
 Ligules 5-6 mm. long, sky-blue or pinkish; involucre 6-8 mm. broad 95 *E. sparsifolius*.

XXIII. FILIFOLII.

- Involucre hirsute. 96. *E. filifolius*.
 Involucre strigose. 97. *E. linearis*.

XXIV. LUTEL.

Bracts strigose or hirsute; plant caespitose; leaves narrowly linear.

Stems scapiform, naked or with a few small leaves; bracts strigose.

98. *E. luteus*.

Stems more or less leafy; bracts hirsute.

Petioles of the leaves hirsute-ciliate.

99. *E. ochroleucus*.

Petioles as well as the blades finely cinereous-strigose.

100. *E. peucephyllus*.

Bracts long-villous; leaves spatulate.

14. *E. aureus*.

1. *E. minor* (Hook.) Rydb. Biennial; stem more or less hirsute; basal leaves spatulate or oblanceolate, petioled, 3–6 cm. long, ciliate or glabrate; stem-leaves linear, 3–10 cm. long, acute; peduncles erect, 1–5 cm. long; involucre 6–8 mm. high, 10–15 mm. wide; bracts hirsute; ligules about 2 mm. long, erect, rose-colored or whitish. *E. glabratus minor* Hook. *E. armeriaefolius* A. Gray, not Turcz. Damp places: Sask.—Colo.—Utah—B.C. *Submont.*—*Mont.* Jl–S.

2. *E. lonchophyllus* Hook. Biennial; stem more or less hirsute; lower leaves petioled, narrowly oblanceolate, 6–15 cm. long, hirsute-ciliate or glabrate; peduncles usually elongate, 2–8 cm. long; involucre about 8 mm. high and 15 mm. broad; bracts hirsute; ligules 2–3 mm. long, erect. *E. racemosus* Nutt. Wet places: Sask.—Colo.—Nev.—Ida. *Submont.*—*Mont.* Jl–Au.

3. *E. politus* Fries. Stem simple, erect, 4–8 dm. high, glabrous or nearly so; basal leaves oblanceolate, 5–10 cm. long, glabrous; stem-leaves lanceolate or linear-lanceolate, sessile; involucre 7–8 mm. high, 10–12 mm. broad; ligules 3–4 mm. long, erect, convolute-filiform. *E. glabratus* Hook., not Hoppe. Rocky mountains: Alta.—Ida.—B.C.; n Scandinavia. *Subalp.* Jl–Au.

4. *E. droebachensis* Muell. Stem simple, glabrous or sparingly hirsute; basal leaves 5–10 cm. long, ciliate; stem-leaves narrowly oblanceolate to linear-lanceolate; involucre about 6 mm. high and 1 cm. broad; ligules about 3 mm. long, white. *E. acris droebachensis* Blytt. Woods: N.B.—Sask.—Colo.—Alaska; n Eu. *Submont.*—*Mont.* Jl–Au.

5. *E. yellowstonensis* A. Nels. Stem mostly simple, stout, often purplish, hirsute and puberulent; lower leaves oblanceolate, petioled, 3–8 cm. long, hirsute; upper stem-leaves sessile, linear or linear-lanceolate; involucre 8 mm. high, 10–12 mm. broad; rays filiform, convolute, scarcely 2 mm. long. *E. lapiduleus* A. Nels. Mountains: Alta.—Colo.—B.C. *Submont.*—*Mont.* Jl–Au.

6. *E. elatus* (Hook.) Greene. Stem mostly simple, 3–4 dm. high, sparingly hirsute; basal leaves spatulate, 2–7 cm. long; stem-leaves lanceolate to nearly linear; involucre hemispheric, 7–8 mm. high, 10–15 mm. broad; ligules about 3 mm. long, erect, convolute. *E. alpinus elatus* Hook. High mountains: Canadian Rockies. *Subalp.* Jl–Au.

7. *E. jucundus* Greene. Stems often several, puberulent and sparingly hirsute; basal leaves spatulate or oblanceolate, petioled, 3–5 cm. long, sparingly hirsute-pilose; stem-leaves linear-lanceolate or oblong; heads solitary or few; involucre 6 mm. high, 8–10 mm. broad; bracts often purple-tinged; ligules erect, pink, 2–2.5 mm. long. *E. acris debilis* A. Gray. *E. debilis* Rydb. Wet places: Que.—Hudson Bay—Colo.—Utah—B.C. *Submont.*—*Subalp.* Jl–Au.

8. *E. alpinus* L. Stem 1–3 dm. high, sparingly pubescent; basal leaves spatulate, petioled, 2–5 cm. long, hirsute; stem-leaves sessile, linear-lanceolate; heads usually solitary; involucre 8–10 mm. high, 1–2 cm. broad; ligules white, rose, or lilac, about 4 mm. long, erect, involute. High mountains: Canadian Rockies; subarctic Eurasia. *Alp.*

9. *E. unalaschensis* (DC.) Rydb. Low perennial, with a short, somewhat caespitose rootstock; stem 3–20 cm. high, villous with blackish hairs, somewhat thickened under the involucre; leaves mostly basal, 1–4 cm. long, spatulate, obtuse, hirsute; involucre 8–10 mm. high, 10–15 mm. broad; bracts black-purple; ligules 2–3 mm. long, 0.5 mm. wide, erect or ascending, often becoming involute. *E. uniflorus pulchellus* Fries. *E. pulchellus unalaschensis* DC. Arctic-alpine situations: Greenl.—Lab.—Mont.—Alaska. *Alp.* Jl–Au.

10. *E. melanocephalus* A. Nels. Stem erect, 5–15 cm. high, monocephalous, villous with black-purplish hairs, especially above; leaves spatulate or

late; ligules 4 mm. long, pale rose or white. Stony hills: Wash.—Mont. *Submont.* Jl—Au.

20. *E. flabellifolius* Rydb. Stem 1–2 dm. high, glandular-puberulent above; basal leaves petioled, about 3 cm. long, slightly glandular-puberulent; stem-leaves cuneate or obovate, less divided; heads about 10 mm. high and 10–15 mm. in diameter; bracts linear, acuminate, glandular-puberulent; ligules 7–8 mm. long, light pink or white. Rocky slides: Wyo. *Alp.* Au.

21. *E. leiomerus* A. Gray. Stem 5–15 cm. high, often decumbent at the base; basal leaves spatulate, obtuse, 3–8 cm. long, glabrous or nearly so; stem-leaves few and small, linear or oblong; heads solitary; involucre 5–6 mm. high, 10–15 mm. broad; bracts linear, acute, purplish; ligules about 40, violet, 6–8 mm. long *E. minusculus* Greene. *E. Garretii* A. Nels. Alpine peaks: Wyo.—N.M.—Utah—Alta. *Submont.*—*Alp.* Jl—Au.

22. *E. spathulifolius* Rydb. Stem 5–8 cm. high, glabrous or slightly puberulent above; basal leaves 2–3 cm. long, glabrous, broadly spatulate; stem-leaves linear-oblong, obtuse; involucre about 1 cm. broad; bracts linear-lanceolate, acute, slightly glandular-puberulent; ligules light blue, in age white, about 8 mm. long. High mountains: Wyo. *Alp.* Jl—Au.

23. *E. controversus* Greene. Stem 5–15 cm. long, scapiform, strigose, especially above, monocephalous; basal leaves oblanceolate or oblong-spatulate, 3–6 cm. long, minutely puberulent or glabrate except the margins; stem-leaves few, linear, near the base; bracts linear, acute, glandular-puberulent, as well as sparingly strigose, purplish; ligules pale purple or white, 5–8 mm. long. Mountains: Utah. *Submont.*—*Subalp.* Je—Au.

24. *E. glandulosus* Porter. Stem 5–15 cm. high, glandular-scabrous; basal leaves numerous, 3–8 cm. long, oblanceolate or linear-oblanceolate, glandular-scabrous; stem-leaves small and linear; heads solitary; involucre 6–8 mm. high, 10–15 mm. broad; bracts linear, acute, glandular-puberulent and hirsute; ligules purple or blue, 8–10 mm. long. Hills and mountains: Wyo.—Colo. *Submont.*—*Alp.*

25. *E. gracilis* Rydb. Stem ascending, strigose, about 15 cm. high, monocephalous; basal leaves oblanceolate or linear-oblanceolate, 2–5 cm. long; stem-leaves narrowly linear, acuminate; involucre about 6 mm. high, 10–12 mm. broad; bracts narrowly linear, tinged with purple, strigose; ligules about 50, light purple, 7–10 mm. long. Meadows and hillsides: Wyo. *Submont.* Jl—Au.

26. *E. Engelmannii* A. Nels. Stem decumbent at the base, 3–20 cm. long; basal leaves numerous, linear or linear-oblanceolate, grayish-strigose, 3–10 cm. long; stem-leaves smaller; heads usually solitary; involucre about 5 mm. high and 1 cm. broad; ligules white or rarely lilac, about 40, 5–7 mm. long. *E. simulans* Greene. Stony slopes: Mont.—Colo.—Utah—Ida. *Submont.* Je—Jl.

27. *E. ursinus* D. C. Eat. Stem 1–2 dm. high, ascending, sparingly hairy or glabrous; basal leaves numerous, oblanceolate or linear-oblanceolate, 3–8 cm. long; stem-leaves linear or linear-lanceolate, acute; involucre 5–7 mm. high, 10–15 mm. wide; bracts hirsute and glandular-puberulent, linear, acute; ligules purple or violet, 8–10 mm. long. Mountains: Mont.—Colo.—Utah—Ida. *Submont.*—*Subalp.* Jl—Au.

28. *E. Evermannii* Rydb. Scapose perennial with a caespitose rootstock; leaves basal, narrowly spatulate, 2–4 cm. long, glabrous, obtuse; stem-leaves if present less than 5 mm. long; stem scapiform, 3–5 cm. long, slightly strigose above, otherwise glabrous; involucre hemispheric, about 1 cm. broad; bracts linear, abruptly acute, purple-tinged, sparingly hirsute-villous; ligules about 20, apparently white, 8 mm. long. Mountain tops: Ida. *Alp.* Au.

29. *E. Peasei* Rydb. Stem 5–8 cm. high, with 1–4 leaves; basal leaves about 2 cm. long, petioled, oblanceolate, acute, strigose; stem-leaves linear, sessile; heads solitary; involucre 4–5 mm. high, about 1 cm. wide; bracts linear-subulate, sparingly hirsute; ligules numerous, about 7 mm. long, pinkish. Mountains: Colo.—e Utah. Je.

30. *E. radicans* Hook. Stem 3–6 cm. high, scapiform, hirsute-strigose; basal leaves oblanceolate to nearly linear, 1–4 cm. long, sparingly hirsute or gla-

bracte; stem-leaves very few, linear; heads solitary; involucre about 5 mm. high and 10 mm. wide; bracts lance-linear, acute, hirsute; ligules white, 4-6 mm. long. Mountains and hills: Sask.—Wyo.—B.C. *Mont.—Alp.* My-Je.

31. *E. vetensis* Rydb. Stem 3-8 cm. high, hirsute, few-leaved; leaves linear or linear-oblongate, hirsute, 2-4 cm. long; heads solitary; involucre 4-5 mm. high, about 10 mm. broad; bracts linear, acuminate, hirsute; ligules purple, 8-10 mm. long. *E. radicans* Gray, not Hook. High mountains: Mont.—Colo.—Utah. *Submont.—Mont.* Je-Au.

32. *E. nanus* Nutt. Stem 5-10 cm. high, hirsute; leaves crowded, densely hirsute, linear-oblongate, 3-5 cm. long; heads solitary; involucre about 5 mm. high and 10 mm. broad, hirsute; bracts linear; ligules 20-50, purple, violet or white, about 6 mm. long. *E. poliospermus* A. Gray. *E. inamoenus* A. Nels. *E. wyomingensis* A. Nels. Hills: Mont.—Colo.—Utah. *Submont.* Je-Au.

33. *E. nematophyllus* Rydb. Stems several, strigose, about 5 cm. high, few-leaved; leaves linear-filiform, 2-4 cm. long, less than 1 mm. wide, strigose; heads solitary; involucre 4-5 mm. high, 8-10 mm. broad; bracts linear, acute, hirsute-strigose; ligules pinkish or white, 4-5 mm. long; outer pappus of short bristles. *E. Eatonii* Coult. & Nels., in part, not A. Gray. Rocky hills: Colo.—Wyo. *Submont.* My-Jl.

34. *E. Bloomeri* A. Gray. Stem scapiform, 5-15 cm. high, finely strigose; basal leaves numerous, 2-10 cm. long, 2-3 mm. wide, cinereous-strigose; involucre 7-8 mm. high, 10-12 mm. broad, softly villous; bracts linear; ligules wanting. Stony ground: Ore.—Ida.—Nev.—Calif. My-Je.

35. *E. pumilus* Nutt. Perennial, with a caespitose short caudex; stem erect, 1-3 dm. high, hirsute, leafy; lower leaves narrowly oblongate, 2-10 cm. long, hirsute, the upper linear; heads several; involucre 7-8 mm. high, 12-15 mm. broad; bracts narrowly linear, acute, hirsute; ligules 50-80, white, 7-10 mm. long, at length reflexed. Dry plains: Sask.—N.D.—Kans.—Utah—B.C. *Plain—Submont.* My-Jl.

36. *E. Brandegei* A. Gray. Stem 2-3 dm. high, sparingly hispidulous-hirsute; basal leaves linear-spatulate, sparingly hirsute; stem-leaves linear, the upper minute; bracts of the involucre linear, short, almost glabrous; ligules 30 or more; inner pappus rather scanty. Adobe plains: sw Utah. *Son.*

37. *E. concinnus* T. & G. Perennial, with a taproot and short caespitose caudex; stem erect, 1-3 dm. high, hirsute with long white hairs, lower leaves linear-oblongate, the upper linear, densely hirsute; heads corymbose; involucre 6-7 mm. high, 10-15 mm. broad; bracts narrowly linear, acute, densely hirsute; ligules 7-9 mm. long. *E. hispidissimum* Piper. Plains and hills: Mont.—N.M.—Calif.—B.C. *Plain—Submont.*

38. *E. condensatus* (D. C. Eat.) Greene. Perennial, with a caespitose caudex; stem usually less than 1 dm. high and monocephalous, hirsute; leaves narrowly spatulate, hirsute, 2-3 cm. long; involucre 5-6 mm. high, about 1 cm. broad; bracts linear, acute, hirsute; ligules white, rarely pinkish, 6 mm. long; pappus double, the outer of broad scales. *E. concinnus condensatus* D. C. Eat. Dry hills: Mont.—Ariz.—Nev. My-Jl.

39. *E. aphanactis* (A. Gray) Greene. Perennial, with a caespitose caudex; stem 1-2 dm. high, branched, short-hirsute; lower leaves spatulate, 3-5 cm. long, hirsute, the upper linear-oblongate; heads several, corymbose; involucre about 5 mm. high and 1 cm. broad, hirsute; bracts linear, acute, hirsute; rays wanting; pappus double, the outer squamellate. Arid regions: Utah—Nev.—Calif. *Son.* My-Jl.

40. *E. decumbens* Nutt. Perennial, with a taproot and short caudex; stems several, 15-30 cm. high, hirsute; basal leaves linear-oblongate, 6-10 cm. long, 3-nerved, hirsute as well as glandular-scabrous; stem-leaves narrowly linear; heads solitary or few; involucre 6-7 mm. high, 12-15 mm. broad, hirsute; bracts linear, in about 2 series; ligules 30-40, purplish or white, 7-8 mm. long. Plains and hills: Mont.—Wyo.—Calif.—Wash. *Plain—Submont.* Je-Au.

41. *E. microlonchus* Greene. Perennial, with a deep taproot, slightly caespitose; stems few, 1-3 dm. high, strigose; basal leaves 7-12 cm. long, linear-ob lanceolate, 3-nerved, strigose; stem-leaves narrowly linear; heads usually solitary; involucre 6-7 mm. high, 10-15 mm. wide; bracts narrowly linear, acute; ligules 30-40, light purplish, 5-7 mm. long. Grassy plains: Wyo.—Colo.—Ariz.—Ida. *Submont.* Je—Au.

42. *E. elatior* (A. Gray) Greene. Perennial, with a short woody rootstock; stem simple, leafy, 2-6 dm. high, hirsute-villous; leaves ovate-lanceolate, or lanceolate, acute or acuminate, entire, the lower oblanceolate, 3-6 cm. long, hirsute-villous; heads 1-3; involucre 10-13 mm. high, 15-25 mm. broad; bracts linear, attenuate; ligules lilac or purple, 12-15 mm. long. *E. grandiflorus elatior* A. Gray. Wet places: Colo.—Wyo. *Mont.*—*Subalp.* Ji—Au.

43. *E. Coulteri* Porter. Perennial, with a rather slender rootstock; stem 1.5-4 dm. high, sparingly hirsute or glabrate; basal leaves 5-15 cm. long, slender-petioled, lanceolate or ovate-lanceolate; lower stem-leaves with winged petioles, the upper ovate-lanceolate, sessile or somewhat clasping; heads usually solitary; involucre about 1 cm. high and 1.5 cm. broad; ligules numerous, white, about 15 mm. long. *E. leptophyllus* Greene. *E. leucanthemoides* Greene. *E. lucidus* Greene, an entire-leaved form. Mountains: Colo.—N.M.—Utah—Calif.—Wash. *Mont.*—*Subalp.* Ji—S

44. *E. peregrinus* (Pursh) Greene. Perennial, with a rootstock; stem 2-5 dm. high, villous, densely so on the upper part; lower leaves oblanceolate, obtuse, 7-10 cm. long, petioled, the upper lanceolate or ovate-lanceolate, acuminate, more or less sharply few-toothed, sparingly villous, thin; heads solitary; involucre about 15 mm. broad or more; bracts linear-subulate, attenuate, villous, squarrose; ligules numerous, about 1 cm. long. Meadows: Alaska—B.C.—Alta. *Subalp.* Ji—Au.

45. *E. salsuginosus* (Richards.) A. Gray. Perennial, with a short thick rootstock; stem simple, erect, 1-5 dm. high; basal leaves spatulate or obovate, 5-10 cm. long, glabrous or nearly so, entire; upper stem-leaves ovate or lanceolate, sessile or partly clasping; involucre about 1 cm. high, 1.5-2 cm. broad; bracts linear, acuminate, glandular-puberulent; ligules 50-70, purple or violet, 10-15 mm. long. *E. callianthemum* Greene. *E. hesperocallis* Greene. (?) *E. membranaceus* Greene. *E. salsuginosus glacialis* (Nutt.) A. Gray, is a depauperate alpine form. Wet places: Sask.—N.M.—Calif.—Alaska. *Submont.*—*Subalp.*

46. *E. Howellii* A. Gray. Stem 3-5 dm. high, glabrous; peduncle puberulent; basal leaves membranous, glabrous, obovate, petioled; stem-leaves ovate, with broad clasping base; heads solitary; involucre 8-10 mm. high, 15-18 mm. broad, glandular-puberulent; ligules 30-35, about 15 mm. long, white or rose-colored. Wet places: Mont.—Ore.—Wash. *Submont.* Ap—Au.

47. *E. superbus* Greene. Stem 3-6 dm. high, nearly glabrous throughout; basal leaves and lower stem-leaves obovate or oblanceolate, petioled, 3-8 cm. long; upper stem-leaves sessile, ovate, acute; heads few, corymbose; involucre 7-8 mm. long and 12-18 mm. wide; bracts linear, acuminate; ligules 40-60, narrow, white, or rose-colored, 12-18 mm. long. Mountains: Colo.—Utah—Wyo. *Submont.*—*Subalp.* Ji—Au.

48. *E. salicinus* Rydb. Stem simple, 4-7 dm. high, glabrous; lower leaves petioled, about 1 dm. long, narrowly oblanceolate, dark bluish green, 3-nerved; upper leaves linear or linear-lanceolate, sessile and half-clasping; inflorescence corymbiform, leafy; involucre 6-7 mm. high, 12-15 mm. broad; bracts linear-subulate, acuminate; ligules numerous, fully 1 cm. long, purple. Mountains: Colo. *Mont.* Ji—Au.

49. *E. eucephaloides* Greene. Perennial, with a woody caudex; stem about 3 dm. high, glabrous; peduncles scabrous; leaves glabrous, scabrous-ciliate on the margins, the lower narrowly oblanceolate, 7-10 cm. long, the upper lanceolate and clasping; heads 1-3; bracts subulate, with spreading tips, glandular or scabrous-puberulent; ligules bluish purple, 1 cm. long. Morains: Ida. *Mont.* Au.

50. *E. macranthus* Nutt. Stem 4-8 dm. high; basal leaves oblanceolate, petioled, 5-10 cm. long; upper stem-leaves sessile, ovate to linear-lanceolate, acuminate; inflorescence corymbiform; involucre 7-8 mm. high, 12-18 mm. broad; ligules very numerous, 10-12 mm. long, lilac or bluish purple. *E. leophyllus* Greene, a broad-leaved form. Mountains: Alta.—N.M.—Ariz.—Ore.—B.C. *Submont.*—*Mont.* JI-Au.

51. *E. speciosus* DC. Stem 3-5 dm. high; basal leaves linear-oblanceolate, ciliate, 5-10 cm. long, petioled; upper leaves sessile, narrowly lanceolate; heads corymbose; involucre 7-8 mm. high, 12-18 mm. broad; ligules blue or violet, numerous, 12-18 mm. long. Mountains: Alta.—Colo.—Utah—Ore.—B.C. *Submont.*—*Mont.* JI-S.

52. *E. conspicuus* Rydb. Stem 3-5 dm. high, hirsute with long hairs, very leafy; lower leaves oblanceolate, 5-10 cm. long, petioled; upper leaves lanceolate, sessile; heads corymbose; involucre 7-8 mm. high, 15-20 mm. broad; ligules bluish purple, very numerous, narrow, 10-12 mm. long. Mountains: Mont.—Colo.—Wash. *Mont.* JI-S.

53. *E. subtrinervis* Rydb. Stem 3-6 dm. high, hirsute with short hairs; lower leaves oblanceolate, 5-10 cm. long, hirsutulous on both sides; inflorescence corymbiform; involucre 7-8 mm. high, 12-20 mm. broad; ligules numerous, violet, rose-colored or purplish, rarely white, about 1 cm. long. Wooded mountain sides: S.D.—N.M.—Utah—Wash. *Submont.*—*Mont.* JI-Au.

54. *E. incanescens* Rydb. Stem simple, 1.5-3 dm. high, mostly ascending, densely pubescent, leafy; basal leaves oblanceolate or spatulate; stem-leaves about 5 cm. long and 1 cm. wide, oblong to lanceolate, sessile, and somewhat clasping; heads 1-4; involucre about 7 mm. high and 15 mm. broad; bracts cinereous; ligules pale blue or violet, about 15 mm. long. Mountains: Colo. *Mont.* JI-Au.

55. *E. Vreelandii* Rydb. Stem 6-7 dm. high, simple, sparingly pubescent and puberulent; lower leaves petioled, oblanceolate, the rest sessile, lanceolate, somewhat clasping; inflorescence leafy, corymbiform; involucre 7-8 mm. high, 15-18 mm. broad; ligules fully 1 cm. long, very numerous, dark purple. Mountains: Colo. *Submont.* JI.

56. *E. glabellus* Nutt. Stem decumbent at the base, 1.5-4 dm. high, glabrous or sparingly hirsute above; basal leaves oblanceolate, 5-10 cm. long, glabrous; stem-leaves narrowly linear-lanceolate, the upper often much reduced; heads 1-3; involucre 6-7 mm. high, 1-1.5 cm. broad; bracts linear, acuminate; ligules purple. Hills and mountains: Sask.—Wis.—N.M.—Mack. *Submont.*—*Alp.* JI-Au.

57. *E. fruticetorum* Rydb. Perennial, with a caespitose rootstock; stem decumbent at the base, 2-4 dm. high, rather densely and finely hirsute; basal leaves narrowly oblanceolate, 4-10 cm. long, petioled, finely hirsute on both sides; stem-leaves sessile, lanceolate to linear; heads 1-4, long-peduncled; involucre 12-15 mm. broad; bracts linear, acute, softly hirsute, not glandular; ligules numerous, narrow, lilac or white, about 8 mm. long. Mountains among bushes: se Utah. *Mont.* JI-Au.

58. *E. Earlei* Rydb. Stems several, simple, 3-4 dm. high; basal leaves 5-6 cm. long, narrowly oblanceolate, often callous-denticulate; stem-leaves linear and sessile; heads about 3, 6 mm. high; ligules numerous and very narrow, white, about 8 mm. long. *E. strigosus* Rydb. (Fl. Colo.). Meadows: Colo. JI.

59. *E. rubicundus* Greene. Stem decumbent and reddish at the base, rarely 2 dm. high, usually monocephalous, hirsute throughout and glandular above; basal leaves spatulate or oblanceolate, 3-5 cm. long, glabrous except the ciliate margins and the midrib beneath; stem-leaves oblong or lance-oblong, sessile; involucre about 18 mm. broad; bracts linear, sparingly hirsute as well as glandular-puberulent; ligules pink, very numerous, 8-10 mm. long. Mountains: Colo. *Subalp.*—*Alp.* JI-Au.

60. *E. eximius* Greene. Stem 2.5-5 dm. high, sparingly hirsute throughout, decumbent at the base; basal leaves petioled, linear-oblanceolate to spatulate,

glabrous except the ciliate margins, 3-10 cm. long; stem-leaves linear-lanceolate, sessile; heads 1-9; involucre about 15 mm. wide, glandular-puberulent, only with a few hirsute hairs below; bracts linear-subulate; ligules usually light purple, numerous, about 8 mm. long. Meadows: Wyo.—Colo.—e Utah. *Submont.*—*Subalp.* JI-Au.

61. *E. Smithii* Rydb. Stem simple, glabrous or nearly so below, glandular-puberulent above; basal leaves 6-10 cm. long, petioled, oblanceolate or spatulate; upper stem-leaves lanceolate, sessile, more or less clasping; heads 1-5; involucre about 6 mm. high; ligules purplish, 10-12 mm. long. Mountains: Colo.—Utah. *Submont.*—*Mont.*

62. *E. formosissimus* Greene. Stem stout, about 3 dm. high, rather densely long-hirsute; basal leaves oblanceolate, 5-10 cm. long, sparingly hirsute on both sides; stem-leaves lanceolate, sessile; heads 1-3; involucre about 18 mm. broad; bracts linear, usually copiously hirsute as well as glandular-puberulent; ligules lilac or rose-colored, fully 1 cm. long. Mountains: Colo.—N.M. *Submont.* JI-Au.

63. *E. viscidus* Rydb. Stem ascending, 1-5 dm. high, more or less hirsute and glandular-puberulent; basal leaves 3-5 cm. long, oblanceolate, dark green, sparingly hirsute and ciliate on the entire margins; stem-leaves lanceolate, sessile; heads few; involucre about 8 mm. high and 15 mm. broad; bracts very numerous, narrowly linear, acuminate; ligules very numerous, pale blue or rose-colored, about 8 mm. long and 5 mm. wide. *E. iodanthus* Greene. *E. hirtuosus* Greene, a less glandular form. Mountains: Colo.—N.M.—Utah—Ariz. *Mont.*—*Subalp.* Je-Au.

64. *E. philadelphicus* L. Stem 3-10 dm. high, branched above, soft-hirsute; basal leaves oblanceolate, 5-15 cm. long, scarcely petioled, softly pubescent; lower stem-leaves oblong, the upper lanceolate, acute, half clasping; involucre 4-5 mm. high, 8-12 mm. broad, sparingly hirsute; bracts broadly linear, acute; ligules white or pinkish, 5-6 mm. long. Wet fields, meadows, and woodlands: Lab.—Fla.—Calif.—B.C. My-Au.

65. *E. purpureus* Ait. Stem 3-10 dm. high, sparingly hirsute or glabrate above; basal leaves 8-15 cm. long, oblanceolate, acute, sparingly pubescent; upper leaves triangular-lanceolate or ovate, with a broad cordate base, acuminate; involucre 5 mm. high, 10-12 mm. broad; bracts broadly linear; ligules rose or reddish purple, 8-10 mm. long. Wet meadows: Hudson Bay—Mont.—Wash.—Mack. Je-JI.

66. *E. asper* Nutt. Stem strict, erect, 2-3 dm. high, shortly hirsute-strigose; lower leaves linear-oblanceolate, 3-6 cm. long, entire or rarely minutely denticulate, short-pubescent, upper stem-leaves linear-lanceolate, acuminate; heads 1-4; involucre 5-6 mm. high, about 1 cm. wide, hirsute; ligules white, 7-8 mm. long. *E. ancularum* Greene. Prairies and hills: Man.—N.D.—Alta. *Plain*—*Submont.* Je-JI.

67. *E. oblanceolatus* Rydb. Stem 3-5 dm. high, strigose; lower leaves oblanceolate, winged-petioled, 5-10 cm. long; upper leaves lanceolate or linear-lanceolate; heads 1-4; involucre 7-9 mm. high, 15-20 mm. broad; ligules numerous, pink or purple, 10-12 mm. long. Plains and meadows: Mont.—Wyo.—Utah—Ida. *Plain*—*Submont.* Je-Au.

68. *E. consobrinus* Greene. Stem strict, 3-6 dm. high, hirsute with short spreading hairs; lower leaves oblanceolate, 5-8 cm. long, entire or denticulate, short-hirsute; stem-leaves linear-lanceolate, sessile; involucre 6-8 mm. high, 12-18 mm. broad; ligules numerous, white, turning pinkish, about 1 cm. long. *E. fraternus* Greene. Mountain valleys: Colo. *Submont.*—*Mont.* Je-Au.

69. *E. Drummondii* Greene. Stem 2-4 dm. high, strict; lower leaves oblanceolate, short-petioled, densely hirsute, entire or denticulate; upper leaves lance-linear; heads 1-4, with long peduncles; involucre 6-7 mm. high, 10-15 mm. broad; ligules numerous, very narrow, about 1 cm. long, pink or lilac. *E. glabellus pubescens* Hook. Hillsides and mountains: Alta.—Mont.—B.C.—Yukon. *Plain.* Je-Au.

70. *E. ramosus* (Walt.) B.S.P. Annual; stem erect, 3-6 dm. high, corymbosely branched, strigose; basal leaves petioled, 5-10 cm. long, spatulate or oblanceolate, often sparingly serrulate; stem-leaves linear, or nearly so; heads numerous; involucre hirsute, 3-4 mm. high, 6-8 mm. broad; bracts linear, acute; ligules white, numerous, about 5 mm. long; inner pappus of few bristles or in the rays lacking. *E. strigosus* Muhl. Dry places: N.S.—Fla.—Calif.—B.C.; the more hairy western form west of Minn. and Kans. Je-S.

71. *E. Bellidiastrum* Nutt. Stem corymbosely branched above, grayish-hirsutulous; leaves linear-spatulate or linear-ob lanceolate, obtuse, entire, densely hirsutulous; heads numerous; involucre 3-4 mm. high, 7-8 mm. broad; bracts linear, acute, hirsute; ligules light purple or white, 5-6 mm. long. Low ground: S.D.—Tex.—Ariz.—Wyo.—(? B.C.). Plain—Mont. Jl-O.

72. *E. Wootoni* Rydb. Biennial, with a taproot; stem 3-6 dm. high, finely and densely hirsutulous; basal leaves oblanceolate, petioled, 3-10 cm. long, hirsutulous; stem-leaves linear, sessile; heads numerous, corymbose; involucre hirsute, about 4 mm. high and 8 mm. broad; bracts linear, acute; ligules white, 6-7 mm. long. *E. cinereus* A. Gray. Sandy soil: Mont.—N.M.—Ariz. Son.—Submont. Je-Au.

73. *E. divergens* T. & G. Biennial or perennial, with a taproot, branched at the base; stems several, 2-4 dm. high, densely hirsute with short hairs; basal leaves spatulate or oblanceolate, petioled, 2-6 cm. long, entire or rarely somewhat lobed, hirsutulous; stem-leaves linear, sessile; heads numerous; involucre 4-5 mm. high, 8-10 mm. broad, hirsute; bracts linear, acute; ligules numerous, bluish purple or lilac, about 5 mm. long. Low plains and river banks: Mont.—Tex.—Calif.—B.C. Son.—Submont. My-Au.

74. *E. flagellaris* A. Gray. Branched at the base; stem decumbent, usually rooting at the ends and producing new plantlets, strigose; basal leaves spatulate or oblanceolate, 2-4 cm. long, strigose; stem-leaves linear; peduncles naked, 4-10 cm. long; involucre 4 mm. high and 8 mm. broad, hirsute; bracts linear, acute; ligules 5 mm. long, white or purplish. *E. stolonifer* Greene. *E. MacDougalii* Heller. Banks of streams and valleys: S.D.—N.M.—Ariz.—B.C.; Mex. Submont.—Subalp. Ap-Au.

75. *E. commixtus* Greene. Biennial; stem branched at the base, decumbent, hirsutulous, 1-3 dm. long; basal leaves narrowly oblanceolate, entire, or more or less lobed at the apex, densely canescent, 2-4 cm. long; stem-leaves narrowly linear; peduncles 5-10 cm. long; involucre hirsute, 4 mm. high and about 8 mm. broad; ligules about 5 mm. long, white or pink. *E. cinereus* A. Gray, not H. & A. *E. colo-mexicanus* A. Nels. River bluffs: Colo.—Tex.—Ariz.—Utah; Mex. Son.—Submont. Ap-Je.

76. *E. nudiflorus* Buckley. Biennial; stem at first erect, 1-2 dm. high, later producing spreading or decumbent branches, 1-3 dm. long, hirsutulous; basal leaves spatulate, 4-8 cm. long, petioled, hirsutulous; stem-leaves oblanceolate; heads solitary at the ends of peduncles often 1 dm. long; involucre hirsute, about 4 mm. high, 8-10 mm. broad; ligules numerous, white or pinkish, 7-8 mm. long. *E. divergens nudiflorus* A. Nels. Hills and river bluffs: Colo.—Tex.—Ariz.—Nev.; Mex. Son.—Submont. Mr-Au.

77. *E. Wyomingia* Rydb. Stem numerous, erect, 1-2 dm. high, striate, strigose-canescens; basal leaves linear-spatulate, 2-5 cm. long, strigose-cinereous; stem-leaves linear; heads solitary; involucre about 6 mm. high, 12-15 mm. broad; bracts linear, acute, pubescent; ligules about 30, white or pinkish, about 1 cm. long; achenes 3-5 angled. *Wyomingia cinerea* A. Nels * Dry hillsides: Wyo—Colo. Plain—Submont. My-Je.

78. *E. argentatus* A. Gray. Stem 1-3 dm. high; basal leaves linear-ob lanceolate, 2-4 cm. long, 2-4 mm. wide, silvery white; stem-leaves scattered and

*The genus *Wyomingia* seem to be well differentiated as far as the group CANI is concerned, but both the LAEVIPIENTES and TETRAPIEURI connect it with CAESPITOSI and the rest of the genus *Erigeron*.

small, linear; heads solitary; involucre 8-10 mm. high, 15-20 mm. broad, strigose; rays white, 8-10 mm. long. *W. argentata* A. Nels. Arid regions: Mont.—w Colo.—Utah—Nev. *Plain—Son.* Je—Jl.

79. *E. canus* A. Gray. Stem decumbent at the base, 1-2 dm. high, strigose-canescens; basal leaves narrowly linear-oblongeolate, 1-4 cm. long, canescens-strigose; stem-leaves narrowly linear; heads solitary; involucre 5-6 mm. high, 10-12 mm. broad; bracts lanceolate-linear, acute; ligules purplish or white, 6 mm. long. *W. cana* A. Nels. Dry plains and ridges: S.D.—Neb.—N.M.—Wyo. *Plain—Mont.* Jl—Au.

80. *E. corymbosus* Nutt. Stem 1-4 dm. high, corymbosely branched above, short-hirsutulous; basal leaves narrowly linear-oblongeolate, 3-nerved, 5-15 cm. long, densely hirsutulous; stem-leaves linear; involucre 5 mm. high, 8-12 mm. broad; bracts hirsute; ligules lilac or purplish, rarely white, 30-50, about 8 mm. long. *E. Nelsonii* Greene. Plains: Mont.—Wyo.—Calif.—B.C. *Plain.* Je—Au.

81. *E. subcanescens* Rydb. Stem erect, canescens-hirsutulous; basal leaves linear-oblongeolate, mostly obtuse, 6-10 cm. long, triple-nerved, densely canescens; involucre 5 mm. high, 10-12 mm. broad; bracts linear, acute, canescens-hirsutulous; ligules white or rarely pinkish, about 8 mm. long. *E. caespitosus laccoblicus* M. E. Jones. Stony slopes and plains: Sask.—Colo.—Utah—B.C. *Plain.* Jl—Au.

82. *E. caespitosus* Nutt. Stem 1-1.5 dm. high, canescens; basal leaves oblongeolate, 5-10 cm. long, less distinctly 3-nerved, obtuse, densely hirsutulous-canescens; involucre 6-7 mm. high, 10-15 mm. wide; bracts linear, hirsute-canescens, acute; ligules 40-50, white, 7-10 mm. long. Dry hills and plains: Sask.—Colo.—Utah—Yukon. *Plain—Mont.* Jl—Au.

83. *E. nauseosus* (M. E. Jones) A. Nels. Stem 1-1.5 dm. high, glandular-puberulent; basal leaves with winged petioles, 3-5 cm. long, spatulate, 3-nerved, glandular-puberulent and ciliate on the margins; stem-leaves spatulate or elliptic, sessile; heads solitary; involucre about 6 mm. high, 12-15 mm. wide; ligules white, 8-10 mm. long, 1 mm. wide. *E. caespitosus nauseosus* Jones. Hillsides. Utah *Submont.* Je.

84. *E. nevadensis* A. Gray. Stem 1-3 dm. high, strigose-canescens; basal leaves narrowly linear-oblongeolate, 3-nerved, canescens, 5-10 mm. long; stem-leaves linear; heads solitary; involucre about 7 mm. high, 12-18 mm. broad, much shorter than the flowers; ligules white or pale blue, 8-12 mm. long. Dry hills and mountains: Utah—Nev.—Calif. *Submont.* My—Jl.

85. *E. Eatonii* A. Gray. Stem 1 dm. high or less, strigose; basal leaves narrowly linear-oblongeolate or linear, 3-nerved, strigose, 5-10 cm. long, 1-4 mm. broad; stem-leaves narrowly linear, often falcate; heads usually solitary; involucre 5-6 mm. high, 7-10 mm. broad; bracts rather few, linear, in about 3 series, but only slightly imbricate; ligules about 20, purplish or white, 6-7 mm. long. Mountains: Utah—Wyo.—Ore. *Submont.—Mont.* Jl—Au.

86. *E. asperugineus* (D. C. Eat.) A. Gray. Perennial, with a caespitose woody caudex; stem monocephalous, less than 1 dm. high, hirsutulous-canescens; basal leaves thick, spatulate, petioled, 1-3 cm. long, densely hirsutulous-canescens; stem-leaves small, oblong or oblongeolate; involucre 5-6 mm. high, 10-12 mm. broad, hirsute; bracts linear, slightly imbricate; ligules about 20, bluish or purple, about 8 mm. long. *E. elkoensis* Nels. & Macbr. Dry hills and mountains: Mont.—Wyo.—Nev. *Submont.—Mont.* Jl—Au.

87. *E. Tweedyi* Canby. Stem scapiform, 5-15 cm. long, canescens-strigose; basal leaves 2-5 cm. long, oval or obovate-spatulate, thick, silvery-canescens; stem-leaves few and small, linear-oblongeolate; heads solitary, or rarely 2 or 3; involucre 5-6 mm. high, 12-15 mm. broad; ligules purple, 5-7 mm. long. Dry mountains and hillsides: Mont.—Wyo. *Mont.—Subalp.* Je—Au.

88. *E. tener* A. Gray. Stem scapiform, 5-10 cm. long, strigose; basal leaves oblongeolate or spatulate, petioled, 2-4 cm. long, rather sparingly strigose; stem-leaves small and linear; heads solitary or rarely 2 or 3; involucre 4-5 mm.

high, 5-10 mm. broad; ligules purplish, 4-5 mm. long. Mountains: Ida.—Mont.—Nev.—Utah. *Submont.*—*Mont.* Au-S.

89. *E. arenarioides* A. Gray. Stem 1-2 dm. high, glabrous, filiform; basal leaves narrowly linear-oblancoelate to almost filiform, 2-4 mm. long, glabrous; stem-leaves linear-filiform, diminishing upwards; heads usually solitary; involucre 4-5 mm. high and nearly 1 cm. wide; bracts linear-subulate, acuminate, glandular-puberulent, slightly purplish; rays bluish purple or white, 5 mm. long; achenes flattened, hirsute; pappus simple. *Aster arenarioides* A. Gray. Mountains: Utah. *Mont.* Jl-Au.

90. *E. laetevirens* Rydb. Stems several, 1.5-2 dm. high, slender, erect or ascending, silky-strigose; basal leaves very narrowly linear-oblancoelate, acute, 5-10 cm. long, sparingly strigose; stem-leaves narrowly linear; heads solitary; involucre 6 mm. high, 12-15 mm. broad, grayish villous-hirsute; ligules numerous, blue or purple, 7-8 mm. long. Mountain slopes: Wyo. *Submont.*—*Mont.* Jl-Au.

91. *E. montanensis* Rydb. Stem 1-2 dm. high, softly strigose; basal leaves narrowly linear to linear-oblancoelate, sparingly strigose, 5-10 cm. long; stem-leaves narrowly linear; heads solitary; involucre about 7 mm. high and 12-15 mm. broad; bracts linear, acuminate, densely hirsute-villous; ligules white or pinkish, 5-7 mm. long, 1.5-2 mm. wide. *E. Tweedyanus* Canby & Rose. *Wyomingia Tweedyana* A. Nels. Dry hills and plains: Mont.—Wyo. *Plain*—*Mont.* My-Au.

92. *E. Scribneri* Canby. Stem 3-8 cm. high, grayish-strigose; basal leaves linear or narrowly linear-oblancoelate, strigose, 3-5 cm. long; heads solitary; involucre 5-6 mm. high, about 15 mm. wide; ligules 7-8 mm. long. *E. Macouni* Greene. Mountains: Alta.—Wyo. *Mont.*—*Subalp.* Jl-Au.

93. *E. Parryi* Canby & Rose. Stem scapiform, 3-5 cm. high, densely hirsutulous; leaves narrowly linear, 2-4 cm. long, densely hirsutulous; involucre densely hirsute, 5-6 mm. high, 10-12 mm. broad; ligules 6-7 mm. long. Dry hills: Mont. *Mont.* Jl.

94. *E. utahensis* A. Gray. Perennial, with a branched woody caudex, often suffrutescent; stem 3-4 dm. high, silvery-strigose, branched; leaves all narrowly linear, 5-10 cm. long, silvery strigose-canescens; heads solitary, on long peduncles; involucre 6-8 mm. high, 10-12 mm. broad; bracts lance-linear, acuminate, silky-strigose; ligules white, 12-15 mm. long. *E. tetrapleurus* (A. Gray) Heller. Arid regions: s Utah—Ariz. My-Je.

95. *E. sparsifolius* Eastw. Suffrutescent perennial; stem 3-4 dm. high, silvery strigose; lower leaves narrowly oblancoelate, 3-5 cm. long, 4-5 mm. wide, silvery-strigose, the upper narrowly linear or nearly so, the uppermost almost filiform and reduced; involucre hemispheric, 6-8 mm. broad; bracts linear, silvery-strigose; achenes quadrangular, strigose-hirsute. *Wyomingia vivax* A. Nels. Cañons: se Utah—Ariz. *Son.* Je-Au.

96. *E. filifolius* (Hook.) Nutt. Perennial, with a branched woody caudex, often more or less suffrutescent; stem 2-6 dm. high, cinereous-strigose; leaves linear-filiform or filiform, cinereous, 2-5 cm. long; involucre about 5 mm. high and 10 mm. broad; ligules about 8 mm. long, bluish, violet, or white. *E. linearis* Piper, in part. Rocky ground: Mont.—Ida.—Calif.—B.C. *Son.* Je-Au.

97. *E. linearis* (Hook.) Piper. Perennial, with a branched caudex; stem 1-3 dm. high, decumbent at the base, slender, cinereous-strigose; leaves all filiform, cinereous, 3-5 cm. long; involucre 5 mm. high, 10 mm. broad; ligules 7-8 mm. long, white or bluish. Dry or sandy places: Wash.—Ida.—Ore. *Son.* My-Jl.

98. *E. luteus* A. Nels. Perennial, with a caespitose, multicapital caudex; stem 1 dm. high or less, cinereous-strigose; leaves narrowly linear, cinereous-strigose, 3-5 cm. long; heads solitary; involucre about 5 mm. high and 1 cm. broad; ligules 30-40, yellow, 3-4 mm. long. Sandy hillsides and stream banks Wyo. *Plain.* Jl.

99. *E. ochroleucus* Nutt. Perennial, with a caespitose caudex; stem 1-2 dm. high, cinereous-strigose; leaves narrowly linear, 3-7 cm. long, strigose and hispid-ciliate below; heads usually solitary; involucre about 5 cm. high, 10-12 mm. broad; ligules 40-60, ochroleucous or white. Gravelly hills: Ore.—Ida.

100. *E. peucephyllus* A. Gray. Perennial, with a densely caespitose caudex; stems 1-2 dm. high, cinereous-strigose, erect; leaves filiform, cinereous, 2-5 cm. long; heads usually solitary; involucre 4-5 mm. high, 8-10 mm. broad; bracts linear, acute, hirsute; ligules 5-6 mm. long. *E. filifolius* Piper, not Nutt. Dry hills: B.C.—Calif.—Ida.—Sask. Son.—Mont. My-Jl.

101. *E. pulvinatus* Rydb. Pulvinate caespitose perennial, with a very thick woody root and short caudex; leaves basal, densely clustered, linear, 1-2 cm. long, about 1 mm. broad, silvery-strigose; peduncles naked or with a single diminutive leaf, about 3 cm. high, silvery-strigose; involucre hemispheric, about 1 cm. broad; bracts linear, in 3 series, slightly thickened on the back, silvery-strigose, acute; ligules white, 6-7 mm. long; achenes (not mature) flat, hirsute on the margins; pappus of rather few scabrous bristles. Arid places: Utah. Jl.

46. *LEPTILON* Raf. HORSEWEED, CANADA FLEABANE.

Annual or biennial, caulescent herbs. Leaves alternate, narrow. Heads small, paniculate. Involucre campanulate; bracts in 2-3 series; receptacle naked. Ray-flowers few, pistillate, with short white or purplish ligules, not exceeding the disk. Disk-flowers several, perfect, with usually 4-lobed corollas. Anthers obtuse at the base. Stigmas flat, with short, obtuse appendages. Achenes flattened, often pubescent. Pappus of many capillary brittle bristles in one series.

1. *L. canadense* (L.) Britton. Annual; stem erect, 5-30 dm. high, hirsute or glabrate; lower leaves spatulate or oblanceolate, petioled, 2-10 cm. long, hirsute or at least ciliate on the margins, incised to entire; upper stem-leaves linear, entire, sessile; heads numerous in an elongate panicle; involucre 3-4 mm. high and broad; ligules numerous, white. *Erigeron canadensis* L. Waste places and dry soil: Lab.—Fla.—Calif.—B.C.; Mex., W. Ind., and adv. or nat. in Eu. Plain—Submont. Je-N.

47. *ESCHENBACHIA* Moench.

Annual or perennial caulescent herbs. Heads paniculate or corymbose. Involucre campanulate or subcylindric; bracts narrow in 1-3 series. Marginal flowers pistillate, more numerous than the hermaphrodite central ones; corolla with a slender filiform tube, without any ligule; their styles truncate or toothed at the apex. Achenes compressed. Pappus in a single series of soft capillary bristles. [*Conyza* Less., not L.]

1. *E. Coulteri* (A. Gray) Rydb. Annual; stem erect, 3-6 dm. high, hirsute-villous and viscid; lower leaves spatulate or oblanceolate, dentate or lacinate, 2-5 cm. long, hirsute and glandular-puberulent; upper leaves oblong or linear-lanceolate; heads numerous in an elongated panicle; involucre about 3 mm. high and broad; bracts linear-subulate, viscid-hirsute; flowers whitish; pistillate flowers numerous, with an entire corolla-tube; hermaphrodite flowers 5-7. River bottoms: Tex.—Colo.—Calif.; Mex. Son.

48. *BACCHARIS* L. GROUNDSEL TREE.

Perennial caulescent herbs or shrubs, usually with glabrous resinous foliage. Leaves alternate, often leathery, entire or toothed. Heads discoid, dioecious, corymbose or paniculate. Involucre campanulate; bracts imbricate in several series, those of the pistillate heads often more numerous; receptacle flat, pitted, naked. Corollas mostly yellow, those of the staminate plant tubular, those of the pistillate heads filiform. Anthers entire and obtuse at the base. Pappus of filiform bristles, those of the pistillate heads usually elongating in fruit, very fine, those of the staminate heads shorter, scabrous and often tortuose.

Pappus copious, in fruit elongating and surpassing the styles

Pappus-bristles in several series; plant 3-6 dm. high, herbaceous, with a woody base.

1. *B. Wrightii*

Pappus-bristles in one series; plants 1-5 mm. high, shrubby.

Fertile heads hemispherical, 5-10 mm. broad, bracts all acute

2. *B. salicina*.

Fertile heads deeply campanulate, 3-5 mm. broad, outer bracts obtuse

3. *B. Emoryi*.

Pappus scant, little if at all elongating, in fruit not exceeding the styles

Achenes 10-nerved; leaves less than 2 cm. long, subentire.

4. *B. sergiloides*.

Achenes 5-nerved, leaves 5-15 cm. long, serrate.

5. *B. glutinosa*.

1. *B. Wrightii* A. Gray. Herbaceous, with a woody base; stems diffusely branched, 3-6 dm. high, glabrous and angled; lower leaves linear, 2-4 cm. long, glabrous, the upper smaller and linear-subulate; involucre of the staminate heads about 7 mm. high, 10-12 mm. broad; bracts in 3 series, lanceolate, acute, erose-ciliate on the margins; involucre of the pistillate heads 8-10 mm. high, 12-15 mm. broad; bracts in 5-6 series, with more evident scarious margins; achenes oblong, 8-10-ribbed, scabrous, puberulent and cross-rugose; pappus brownish, 10-12 mm. long. Saline soil: Kans.—Colo.—Ariz.—Mex. *Son.* Ap-Je.

2. *B. salicina* T. & G. Shrub 1-4 m. high; branches green and glabrous, angled; leaves oblong or oblong-lanceolate, denticulate or entire, 3-5 cm. long; heads in small clusters; involucre of the staminate heads hemispheric, 4-5 mm. high and slightly broader; bracts in 4-5 series, ovate, yellowish green, glabrous, erose-ciliate on the margins; involucre of the pistillate heads 6-8 mm. high and broad, the inner bracts lanceolate; achenes 10-ribbed, glabrous; pappus white and soft, 10-12 mm. long. Saline soil: Kans.—Utah—N.M.—Tex. *Son.* Je-Jl.

3. *B. Emoryi* A. Gray. A shrub 1-5 m. high; branches very glutinous, glabrous, slightly angled; leaves linear-oblong, entire, 2-5 cm. long, or the larger broader, somewhat 3-ribbed and somewhat lobed, glabrous; heads more or less glomerated; involucre of the staminate heads campanulate, 5-6 mm. high, 4 mm. wide; bracts ovate, acute, thick, in 6-7 series; involucre of the pistillate heads 6-8 mm. high, 4-5 mm. broad; bracts in 7-8 series; achenes glabrous, 10-ribbed; pappus tawny, nearly 1 cm. long. Along rivers: Tex.—s Utah—Calif. *Son.*

4. *B. sergiloides* A. Gray. A shrub 1-2 m. high; branches glabrous, strongly angled, and broom-like; leaves few, oblanceolate, 5-15 mm. long, soon caducous or wanting; heads paniculate; involucre of the staminate heads 3-4 mm. high and as broad, those of the pistillate heads 4-5 mm. high; bracts ovate to lanceolate, acute, glabrous in about 5 series, thick; achenes glabrous, 10-nerved, 1.25 mm. long; pappus tawny, 3-4 mm. long. Arid regions: Ariz.—s Utah—s Calif. *L. Son.*

5. *B. glutinosa* (R. & P.) Pers. Plant herbaceous above, woody below; stem 1-3 m. high; branches striate, glabrous; leaves elongate-lanceolate, 5-15 cm. long, 3-nerved, serrate, or the upper entire; heads numerous, corymbosely eymose; involucre both in the staminate and the pistillate heads 4-5 mm. high and broad, hemispheric; bracts ovate, acute, in 4-5 series, glabrous, erose-ciliate; achenes glabrous, 5-nerved; pappus white, 4 mm. long. Along streams: Tex.—Colo.—Calif.; Mex. and S. Am. *Son.* Mr—N.

49. BERTHELÛTIA DC.

Very leafy silvery-canescens shrubs. Heads glomerate. Involucre campanulate; bracts imbricate, chartaceous, the innermost narrowly linear and falling off with the flowers. Receptacle flat, naked and glabrous. Marginal flowers pistillate, numerous, their corollas with a filiform truncate tube, without ligules; style-branches without appendages. Central flowers perfect, but sterile; their corollas tubular, regularly 5-lobed; styles with entire tips. Achenes 4-5-angled. Pappus of the marginal flowers of a series of capillary bristles; pappus-bristles of the central flowers shorter and with clavellate tips.

1. *B. sericea* (Nutt.) Rydb. A shrub 2-3 m. high, much branched; branches silky tomentose; leaves entire, linear-lanceolate, sessile, acute at each end, 1-3

cm. long, silvery-canescens; heads conglomerate; involucre about 5 mm. high, 5-7 mm. broad; outer bracts broadly ovate, obtuse, the innermost linear, acute. *Polypappus sericeus* Nutt. *Tessaria borealis* T. & G. *Pluchea borealis* A. Gray. Along streams: Tex.—s Utah—Calif.—Mex. *L. Son.* N-Je.

50. STYLOCLINE Nutt.

Floccose woolly annuals, branched from the base, with alternate leaves. Heads glomerate, discoid. Involucre ovoid; bracts more or less scarious and imbricate; receptacle chaffy, the paleae subtending the pistillate flowers more or less boat-shaped, with at least hyaline tips, loosely enclosing the achenes and falling with them, those subtending the staminate flowers scarious-hyaline, deciduous. Marginal flowers pistillate and fertile, numerous, with filiform corollas, without ligules. Central flowers hermaphrodite, but sterile, their corollas tubular, 4-5-toothed. Anthers sagittate at the base. Achenes slightly compressed. Pappus of the pistillate flowers wanting, that of the hermaphrodite flowers of very few capillary bristles.

1. *S. micropoides* A. Gray. Stem 2-10 cm. high, branched from the base, white-tomentose; leaves linear or lance-linear, acute, 5-8 mm. long; paleae of the receptacle with a narrow oblong-ovate hyaline tip, densely long-woolly. Arid plains: N.M.—s Utah—s Calif. *L. Son.* Ap-My.

51. ANCISTROCÁRPHUS A. Gray.

Floccose annuals, branched at the base, with alternate leaves. Heads discoid. Bracts of the involucre boat-shaped, enclosing each a marginal flower, firm, with a hyaline tip. Central flowers subtended by 5 open paleae, these being coriaceous-herbaceous, ovate-lanceolate, ending in incurved hooked spines, persistent, and in age spreading. Marginal flowers 5-9, pistillate and fertile, with filiform corollas. Central flowers few, hermaphrodite and sterile. Achenes obovate-fusiform. Pappus wanting in all flowers.

1. *A. flagineus* A. Gray. Stem erect or diffuse, 2-5 cm. high, appressed lanate; leaves linear to spatulate, 1 cm. long or less, lanate; heads capitate-glomerate; paleae with the hook in fruit 4 mm. long. *Stylocene flaginea* A. Gray. Dry hillsides: Calif.—Ida.—Ore. *Son.* Ap-My.

52. PSILOCÁRPHUS Nutt.

Small diffuse, branched floccose annuals. Leaves mostly opposite. Heads small, solitary in the forks or ends of the branches. Involucre globose; bracts few; receptacle globose, chaffy; paleae or bractlets subtending the pistillate flowers cucullate-saccate, semi-ovate or semi-cordate in outline, rounded at the top, herbaceous-membranous, and with hyaline, porrect or erect appendages; paleae of the hermaphrodite flowers wanting. Marginal flowers pistillate and fertile, with filiform corollas, numerous. Central hermaphrodite and sterile flowers few, with tubular, 5-toothed corollas; achenes cylindric. Pappus wanting in all flowers.

Involucre with long loose wool, upper leaves not narrowed at the base. 1. *P. elatior*.
Involucre with very short wool, leaves all narrowed at the base. 2. *P. oreganus*.

1. *P. elatior* A. Gray. Stem erect or ascending, 5-15 cm. high, with spreading branches, densely tomentose; leaves oblanceolate or linear-spatulate, 1-2 cm long, loosely white-tomentose, those subtending the heads elliptic; heads 6-8 mm. broad; involucre densely woolly-tomentose. Banks: Ore—Ida.—B.C. *Submont.* Je-Jl.

2. *P. oreganus* Nutt. Stem diffusely branched, 2-6 cm. high; leaves linear-spatulate, about 1 cm. long, finely silky-tomentose; heads 4-6 mm. broad; involucre finely short woolly; bracts in fruit 2 mm. long or less. Banks: Ore.—Ida.—Wash. *Son.* Jl.

53. DIAPÈRIA Nutt.

Low caulescent annuals. Leaves alternate, floccose. Heads globose, glomerate, discoid. Involucre woolly; bracts few, more or less scarious, in several

series. Receptacle convex, chaffy. Paleae of the pistillate flowers barely concave, scarious, deciduous, those of the central flowers similar or with woolly tips. Marginal flowers pistillate, fertile, with filiform corollas, and 2 style-branches. Central flowers 2-5, hermaphrodite and usually sterile, with undivided styles. Achenes obcompressed, smooth or very minutely papillose. Pappus wanting. [*Evax* DC., in part.]

1. *D. prolifera* Nutt. Stem erect, simple or with ascending branches from the base, loosely tomentose; leaves spatulate, 1 cm. long or less, loosely tomentose; heads in terminal glomerules, subtended by a rosette of leaves, from which later develop 1-4 branches bearing similar terminal glomerules; involucre cylindraceous or oblong; paleae subtending the fertile flowers chartaceous-scarious, naked; those subtending the staminate flowers herbaceous and woolly-tipped. *Evax prolifera* Nutt. *Filago prolifera* (Nutt.) Britton. Dry ground: S.D.—Ark.—Tex.—Ariz.—Colo. Plain. My-Jl.

54. ÓGLIFA Cass.

Low tomentose erect annuals. Leaves alternate. Heads glomerate, discoid. Involucre oblong or campanulate; bracts scarious, in several series. Receptacle convex or conic, chaffy; paleae or bractlets of the marginal flowers boat-shaped, rather few, enclosing the achenes and stellate-spreading at maturity. Marginal flowers pistillate, with filiform corollas, each subtended by a palea and without pappus. Middle flowers surrounded by a series of open paleae; a few of the central ones hermaphrodite, the others pistillate, all fertile and with a pappus of capillary bristles. Anthers sagittate at the base. Achenes terete or slightly compressed, those of the marginal flowers oblique.

1. *O. californica* (Nutt.) Rydb. Annual; stem erect, 1-2 dm. high, more or less branched, with erect-ascending branches; leaves linear or linear-oblong, 1-2 cm. long; marginal flowers 8-10, their paleae ovate, very woolly; inner paleae oblong, concave, nearly glabrous; achenes oblong, subterete, minutely papillose-granular. *Filago californica* Nutt. Open dry grounds: Ariz.—s Utah—Calif. L. Son. Mr-May.

55. ANTENNÀRIA Gaertn. CATS-PAWS, EVERLASTING.

Woolly perennial herbs, usually stoloniferous or soboliferous. Leaves alternate, the basal ones in the stoloniferous species forming rosettes. Heads discoid, usually corymbose, dioecious.* Involucre many-flowered; bracts imbricate, in several series, those of the staminate heads often broader; receptacle flat, not chaffy. Pistillate flowers fertile, their corollas filiform, truncate. Styles with 2 branches; pappus-bristles capillary, united at the base and falling off together. Staminate or rather hermaphrodite flower with tubular, 5-lobed corollas, rudimentary styles and ovaries, and usually with pappus-bristles somewhat clavate at the apex. Anthers caudate at the base. Achenes terete or nearly so.

Pappus-bristles of the staminate heads with clavate or scarious-dilated tips.

Plants surculose-proliferous with prostrate leafy stolons

Plant caulescent.

Heads racemose or paniculate, long-peduncled; involucre almost glabrous.

I. RACEMOSAE

Heads in cymose clusters or rarely solitary, involucre woolly at the base

Bracts of the involucre with green or brown upper portion.

II. ALPINAE.

Bracts of the involucre with white or pink upper portion.

Heads 5-8 mm high

Bracts usually with bright pink upper portion

III. ROSEAE.

Bracts with white upper portion.

Leaves of the stolons narrowly oblanceolate, 1.5-5 cm long;

bracts with dark spots.

IV. NARDINAE

Leaves of the stolons rhombic to spatulate, 0.5-3 cm long, bracts

with dark spots only in no. 23

V. ARIDAE.

Heads 8-12 mm high.

* The staminate plants are usually much less common than the pistillate ones (except in no. 13) and unknown to the author in nos. 5, 8, 9, 18, and 20. The pistillate flowers often produce seeds, without being fertilized by pollen.

- Leaves tomentose on both sides.
 Leaves glabrous above.
 Plant acaulescent, heads subsessile among the rosettes of the basal leaves.
- VI. APRICAE.
 VII. CAMPESTRES.
 VIII. ROSULATAE.
- Plants not surculose-proliferous, stolons erect.
 Heads 4-5 mm. high, bracts nearly glabrous, scarious throughout, leaves silky-tomentose.
 Heads 6-10 mm. high, bracts tomentose at the base, only tips scarious; leaves villous-tomentose.
 Pappus-bristles of the small staminate heads not clavate; achenes puberulent; hairs bifurcate at the apex; plant low and densely caespitose.
- IX. ARGENTAE.
 X. PULCHERRIMAE.
 XI. DIMORPHAE.

I. RACEMOSAE.

- Leaves of the rosettes oval or spatulate; lower pedicels 2-5 cm. long.
 Leaves of the rosettes oblanceolate; lower pedicels 1 cm. long or less.
1. *A. racemosa*.
 2. *A. oblanatifolia*.

II. ALPINAE.

- Leaves glabrous above.
 Leaves of the rosettes narrowly oblanceolate; heads usually several; bracts of the pistillate heads abruptly acuminate.
 Leaves of the rosettes broadly oblanceolate or spatulate; inner bracts acute or acuminate, the outer obtuse.
 Heads usually solitary.
 Heads 3-6 in a cluster.
3. *A. alpina*.
 4. *A. monocephala*.
 5. *A. chlorantha*.
- Leaves tomentose on both sides; bracts acute or obtuse.
 Leaves of the rosettes broadly obovate-cuneate, subsessile.
 Heads 7-8 mm. high, leaves 8-10 mm. long; tips of bracts dark brown.
 Heads 5-6 mm. high; leaves less than 8 mm. long; tips of the bracts light brown.
6. *A. pulvinata*.
 7. *A. albescent*.
 8. *A. fusca*.
- Leaves of the rosettes spatulate or oblanceolate, distinctly petioled.
 Heads 6-8 mm. high.
 Heads 5-6 mm. high.
 Bracts very dark, almost black at the base, but often with white tips.
 Inner bracts of the pistillate heads acute.
 Leaves narrowly oblanceolate, acute or short-acuminate, tomentum very fine and appressed.
 Leaves spatulate or broadly oblanceolate, obtuse, tomentum rather loose.
 Bracts obtuse or rounded.
 Bracts moderately dark, umber-colored to light brown.
 Inner bracts not rose-colored.
 Leaves appressed-tomentose, shining and yellowish.
 Bracts of the pistillate heads linear-lanceolate, acute.
 Bracts of the heads oblong, obtuse.
 Heads sessile, stolons decumbent.
 Heads peduncled, stolons ascending.
 Leaves white-tomentose, very rarely yellowish.
 Heads 2 or 3, leaves broadly obovate-spatulate.
 Heads several; leaves spatulate or oblanceolate.
 Bracts of the pistillate heads obtuse.
 Involucres more or less viscid, bracts with whitish tips.
 Involucres not viscid, bracts umber-colored.
 Bracts of the pistillate heads acute.
 Inner bracts rose-colored.
9. *A. acuta*.
 10. *A. media*.
 11. *A. mucronata*.
 12. *A. Sansoni*.
 13. *A. flarescens*.
 14. *A. confinis*.
 15. *A. aizoides*.
 16. *A. umbrinella*.
 17. *A. Macounii*.
 18. *A. concinna*.

III. ROSEAE.

- Leaves cuneate-spatulate, obtuse, without distinction between blade and petiole.
 Leaves oblanceolate or spatulate, with distinct petioles.
 Leaves narrowly oblanceolate, acute.
 Leaves broadly spatulate, obtuse.
18. *A. concinna*.
 19. *A. rosea*.
 20. *A. imbricata*.

IV. NARDINAE.

One species.

V. ARIDAE.

- Stem-leaves 6-8 mm. wide, oblong or the uppermost lanceolate.
 Stem-leaves 2-5 mm. wide, linear or oblanceolate.
 Bracts with a large brown or green spot, more or less viscid.
 Bracts slightly if at all spotted, not viscid.
 Bracts of the pistillate heads obtuse, plant 1-2 dm. high.
 Bracts of the pistillate heads with oblong to linear upper portions.
 Bracts of the pistillate heads with oval or obovate upper portions.
21. *A. corymbosa*.
 22. *A. foliacea*.
 23. *A. sedoides*.
 24. *A. arida*.
 25. *A. scariosa*.

Bracts of the pistillate heads acute, at least the inner ones.

Inflorescence and upper leaves glandular-hairy; leaves of the inflorescence

large, scarcely smaller than the upper stem-leaves; bracts greenish

Leaves of the stolons 5-15 mm. long, rhombic-spatulate; tomentum very

fine, appressed and silky 26 *A. microphylla*.

Leaves of the stolons spatulate, usually rounded at the apex, 15-30 mm.

long, tomentum looser. 27. *A. bracteosa*

Inflorescence and upper leaves not glandular, the latter reduced; bracts

brownish. 28. *A. oxyphylla*

VI. APRICAE.

Plant tall, 2-3 dm. high; heads usually peduncled

Leaves less than 2 cm. long and 5-8 mm. wide, usually not triple-nerved; heads 7-9

mm. high

Leaves over 2 cm. long, 7-10 mm. wide, triple-nerved; heads about 1 cm. high.

Plant low, usually less than 1 dm. high; heads subsessile.

29 *A. obovata*.

30. *A. aprica*.

VII. CAMPESTRES.

Plant about 3 dm. high, basal leaves distinctly triple-nerved.

31. *A. Howellii*

Plant 1 dm. or less, basal leaves not distinctly triple-nerved.

Inflorescence not glandular, bracts of the pistillate heads lanceolate or linear-lanceo-

late, acute; those of the staminate heads oblong, obtuse. 32. *A. campestris*

Inflorescence more or less glandular-hairy, bracts in both heads ovate to lanceolate,

acute or acutish, in the staminate broader. 33. *A. marginata*.

VIII. ROSULATAE

Bracts with white upper portion; leaves white on both sides

34. *A. rosulata*

Bracts with brown upper portion; leaves glabrate above

35. *A. Sierrae-Blancae*

IX. ARGENTAE.

Basal leaves oblanceolate.

36. *A. oblanceolata*.

Basal leaves very narrowly linear-oblanceolate

37. *A. luzuloides*

X. PULCHERRIMAE

Bracts with a large dark spot, those of the pistillate heads ovate to lanceolate, acute, those of the staminate heads ovate or oval, obtuse or acutish, pistillate heads 6-10 mm. high, turbinate at the base

Plants 1-2 dm. high; ribs of the leaves not conspicuous; outer bracts wholly fuscous.

38. *A. lanata*

Plants 3-5 dm. high; leaves with conspicuous ribs; tips of the bracts brownish or white

39. *A. pulcherrima*

Bracts with small dark spots or none; bracts of both staminate and pistillate heads with oblong or oval, obtuse tips, those of the staminate heads slightly broader

40. *A. anaphaloides*.

XI. DIMORPHAE

Plant without filiform stolons

Fruiting heads not over 1.5 cm. high; leaves oblanceolate, stem 1-3 cm. high.

41. *A. dimorpha*

Fruiting heads about 2 cm. high; leaves spatulate, loosely tomentose; stem 3-5 cm. high

42. *A. macrocephala*.

Plants with filiform ascending stolons.

43. *A. flagellaris*

1. *A. racemosa* Hook. Stem of the pistillate plant 2-5 dm. high, glabrous or puberulent; leaves of the rosettes 3-ribbed, petioled, 3-7 cm. long, white-tomentose beneath, glabrate above; stem-leaves lanceolate or linear, sessile; heads many; involucre 6-8 mm. high and about as broad; bracts ovate to lanceolate, acute, light greenish yellow; stem of staminate plant 1-3 dm. high; involucre more hemispheric, 5 mm. high; bracts elliptic, obtuse, the inner slightly white-tipped. Woods and hillsides: Alta.—Wyo.—Calif.—B.C. *Submont.*—*Mont.* Je—Au.

2. *A. oblancifolia* E. Nels. Stem of the staminate plant 1-2 dm. high; basal leaves oblanceolate, 2-3 cm. long, sparingly tomentose or glabrate above, appressed, white-tomentose beneath; stem-leaves narrowly oblanceolate or linear, acute or acuminate; heads 4-13; involucre 4-5 mm. high, sparsely woolly; bracts oval, obtuse, or rounded, light brownish green below, often with a purplish spot and white tips. Wooded slopes: w Wyo. *Mont.* Jl.

3. *A. alpina* (L.) Gaertn. Stem 5-15 cm. high, floccose; leaves of the stolons silky-tomentose, 8-20 mm. long, 2-4 mm. wide; heads usually 3-5, conglomerate; involucre about 5 mm. high and 8 mm. broad; bracts of the very rare staminate head pale, elliptic, obtuse, those of the pistillate heads dark greenish brown, lanceolate, long-acuminate. Arctic-alpine situations: Greenl.—Lab.—Alta.—B.C.; n Eur. *Alp.* Jl—Au.

4. *A. monocephala* DC. Stem 5-10 cm. high; leaves of the rosettes cuspidate-mucronate, 8-15 mm. long, silky-tomentose beneath; stem-leaves linear, 5-10 mm. long; involucre about 5 mm. high and 8 mm. broad; bracts of the (rare) staminate heads broadly ovate, obtuse or acutish, those of the pistillate heads lanceolate, the outer obtuse, the inner acute or acuminate. Arctic-alpine situations: Alaska.—B.C.—Alta. *Alp.* Jl.

5. *A. chlorantha* Greene. Stem 7-15 cm. high; basal leaves and those of the rosettes mucronate or acutish, loosely floccose, densely and permanently so beneath, 1.5-2.5 cm. long; stem-leaves oblong-linear; heads 3-6, somewhat conglomerate; involucre about 7 mm. high; bracts of the pistillate heads with dark olive-green tips, the outer obtuse, the inner acute or acuminate. Mountains: B.C. *Mont.* Jl—Au.

6. *A. pulvinata* Greene. Stem 5-10 cm. high, densely white-tomentose; leaves of the rosettes densely white-tomentose on both sides, with loose villous tomentum; stem-leaves oblanceolate or oblong, acute; heads 5-8, in a dense cluster; bracts of the staminate heads brown, oblong and obtuse, those of the pistillate heads similar, but the inner more lanceolate and acute. Mountains: Alta.—Mont.—B.C. *Mont.—Alp.* Je—Au.

7. *A. albescens* (E. Nels.) Rydb. Stem 1 dm. or less high, tomentose; leaves of the stolons 4-8 mm. long, densely and closely white-tomentose, obovate; stem-leaves oblanceolate; heads 3-5 in a dense subcapitate cluster; bracts elliptic, obtuse, light brown or yellowish. *A. pulvinata albescens* E. Nels. Mountains: Alta.—Mont.—Ida. *Submont.—Subalp.* Je—Jl.

8. *A. fusca* E. Nels. Stem 1-1.5 dm. high, tomentose; leaves of the rosettes 15-22 mm. long, white-tomentose, with a close silky pubescence; stem-leaves linear or linear-oblanceolate; heads 3-13, pedicellate, corymbose; bracts of the pistillate heads elliptic or oblong, obtuse, greenish brown. Open woods: Wyo.—Ida. *Mont.* Au.

9. *A. acuta* Rydb. Stem slender, 5-12 cm. high; leaves of the rosettes 15-25 mm. long, 2-4 mm. wide; stem-leaves narrowly linear or linear-oblanceolate; heads 3-5, conglomerate, sessile; bracts of the pistillate heads lanceolate to linear-lanceolate, dark greenish brown with slightly lighter tips, the inner acute. Mountains: Alta. *Subalp.—Alp.* Jl—Au.

10. *A. media* Greene. Stem 5-10 cm. high, loosely tomentose; leaves of the rosettes 1-2 cm. long; heads 4-7, densely conglomerate; bracts of the staminate head elliptic and obtuse, very dark green, or the innermost sometimes with whitish tips; outer bracts of the pistillate head oblong, obtuse, the inner lanceolate, acute. *A. austromontana* E. Nels. Higher peaks: Alta.—Colo.—Calif.—B.C. *Alp.—Subalp.* Jl—Au.

11. *A. mucronata* E. Nels. Stem 5-12 cm. high, tomentose; leaves of the rosettes oblanceolate or narrowly spatulate, 1-2 cm. long; stem-leaves oblong-linear, acute; heads 4-8, conglomerate; bracts in both the pistillate and the staminate heads oblong or elliptic, obtuse, dark brownish green, the inner bracts, especially in the staminate heads, often with whitish tips. Mountains and rocky slopes: Alta.—Wyo.—B.C. *Alp.—Subalp.*

12. *A. Sansoni* Greene. Stem 1-2.5 dm. high, slender; leaves of the rosettes linear-spatulate or oblanceolate, 1-2 cm. long; stem-leaves linear, acute or acuminate, erect; heads 8-10, cymose and peduncled; involucre 6-7 mm. high and nearly as wide; bracts of the pistillate heads oblong or lanceolate, the inner acute, brownish below, dirty white, yellowish or pinkish towards the apex, those of the staminate heads oblong, obtuse. Hills and mountains: Alta.—Mont.—B.C. *Submont.* Je—Jl.

13. *A. flavescens* Rydb. Stem about 1 dm. high; leaves of the stolons broadly spatulate, about 1 cm. long, acute, densely tomentose on both sides; stem-leaves oblong or linear; heads 4-8, in a dense subcapitate cluster; involucre 4-5 mm. high, 5 mm. broad; bracts isabel-colored or yellowish, in the staminate heads broadly elliptic, in the pistillate heads oblong, in both obtuse. *A. reflexa* E. Nels., in part. Dry hills: Mont.—Colo.—Wash. *Submont.—Mont.* My—Jl.

14. *A. confinis* Greene. Cespitose, somewhat* suffrutescent perennial; stem 1-2 dm. high, tomentose; leaves of the rosettes oblong-spatulate, about 1 cm. long, tomentose on both sides; tomentum loose; heads usually peduncled, numerous, in a corymbiform inflorescence; involucre about 5 mm. high; bracts of the pistillate ones oval to oblong, obtuse, brownish or yellowish, those of the staminate heads somewhat broader. Mountains: Ida.—Ariz.—Calif.—Ore. *Mont.* Je-Jl.

15. *A. aizoides* Greene. Stolons ascending; stem 3-8 cm. high; leaves of the stolons thick, 10-15 mm. long, with a very fine silvery-white shining tomentum; stem-leaves linear or linear-oblong; heads 2 or 3, sessile; involucre 4-5 mm. high, densely tomentose at the base; bracts of the staminate heads ovate to obovate, dark brown, rounded at the apex. Barren hills and mountains: Sask.—B.C. *Plain.* Je-Au.

16. *A. umbrinella* Rydb. Stem about 1 dm. high; leaves of the rosettes spatulate, 1-1.5 cm. long, densely white-tomentose; stem-leaves linear-oblong; heads 3-8, conglomerate; involucre about 5 mm. high, bracts of the staminate heads elliptic, obtuse, isabel-colored (dirty yellowish), those of the pistillate heads similar, but darker, usually light umber-colored, and the inner narrower. Higher mountains: Mont.—Colo.—B.C. *Mont.—Alp.*

17. *A. Macounii* Greene. Stem 5-15 dm. high; leaves of the stolons obovate or spatulate, 1-1.5 cm. long, sometimes yellowish; heads 3-8 in a close glomerate cluster; bracts of the staminate heads brown, elliptic or oval, very obtuse, more or less spreading; outer bracts of the pistillate heads oblong, obtuse, the inner ones linear-lanceolate, acute. *A. reflexa* E. Nels., mainly. Mountains: Alta.—Wyo.—B.C. My-Au.

18. *A. concinna* E. Nels. Stem slender, 10-15 cm. high; leaves of the rosettes spatulate or obovate, scarcely petioled, abruptly acute, about 1 cm. long, 2-4 mm. broad, white-tomentose with rather loose tomentum; stem-leaves linear-oblong or linear; heads 6-15, conglomerate or in more open clusters; bracts of the pistillate heads elliptic, obtuse, the outer brownish, the inner pinkish. Hills: Wash.—Ore.—Colo.—Wyo. *Submont.—Mont.* Je-Jl.

19. *A. rosea* (D. C. Eat.) Greene. Stem 2-4 dm. high, slender, tomentose; leaves of the rosettes acute, 15-20 mm. long, white-tomentose, with close tomentum; heads usually many; involucre about 5 mm. high and broad; bracts of the rare staminate head broadly elliptic, pale pink, those of the pistillate heads elliptic to linear-oblong, obtuse, rose or rarely dull white. *A. dioica rosea* D. C. Eat. *A. parvifolia* [?] Nutt., in part] Rydb. *A. sordida* Greene. Meadows: Alta.—S.D.—Colo.—Calif.—Yukon. *Plain—Subalp.* Je-Au.

20. *A. imbricata* E. Nels. Stem 1-3 dm. high; leaves of the rosettes mucronate, petioled, about 2 cm. long, grayish-tomentose, with appressed tomentum; stem-leaves ample, oblong or oblanceolate; heads in a close cluster; involucre hemispheric, about 7 mm. high and broad; bracts of the pistillate heads pinkish, elliptic, obtuse or the inner rarely acutish. *A. rosea imbricata* E. Nels. Hills: Alta.—Colo. Je-Jl.

21. *A. corymbosa* E. Nels. Stem 2-3 dm. high; leaves of the rosettes thin, sparsely tomentose, with appressed tomentum, 3-3.5 cm. long; stem-leaves linear, acuminate; heads peduncled, corymbose; involucre 4-5 mm. high; bracts of the pistillate heads elliptic and obtuse or the innermost lanceolate and acute, those of the staminate plant broadly oval and rounded at the apex. *A. nardina* Greene. Meadows: Mont.—Colo.—Ida.—Ore. *Submont.—Subalp.*

22. *A. foliacea* Greene. Stem 3-4 dm. high; leaves of the rosettes cuneate-obovate or broadly spatulate, 1-2 cm. long, white-tomentose on both sides, with rather loose tomentum; stem-leaves ample, 2-3 cm. long; heads many, pedicelled, corymbose; involucre about 6 mm. high; bracts of the pistillate heads dirty white, the outer oblong or elliptic, obtuse, the inner linear-lanceolate, acute; staminate plant unknown. Mountains: Mont. *Submont.* Au.

23. *A. sedoides* Greene. Stem about 1 dm. high; leaves of the rosettes spatulate, less than 1 cm. long, densely and finely white-tomentose on both sides;

heads 4-6, conglomerate, sessile; involucre 5-6 mm. high; lower portion of the pistillate bracts brownish or greenish; tips dirty white, oblong, obtuse or acutish. *A. arida viscidula* E. Nels. *A. viscidula* Rydb. High mountains: B.C.—Colo.—Man. *Mont.—Alp.* Jl.

24. *A. arida* E. Nels. Stem 1-2 dm. high, slender; leaves of the rosettes spatulate, acutish, 8-12 cm. long, densely and finely appressed-tomentose on both sides, often conduplicate; stem-leaves often twisted or curved; heads 6-10, sessile, conglomerate; involucre 5-6 mm. high; bracts of the pistillate heads oblong, obtuse, milky-white, those of the staminate heads rounded oval. Dry plains and hills: *Mont.—N.M.—Utah—Ida. Submont.—Mont.* Je-Jl.

25. *A. scariosa* E. Nels. Stem 1 dm. high or less; basal leaves spatulate, obtuse or acutish, 1-1.5 cm. long, white-floccose on both sides; stem-leaves oblong or linear-oblong; heads several, somewhat congested; involucre 7-8 mm. high; bracts of pistillate and staminate heads with obovate or oval, obtuse, white tips. Hills: Wyo. *Submont.* Je.

26. *A. microphylla* Rydb. Stem slender, strict, 2-3 dm. high; stem-leaves linear-oblong, small; heads 5-30, conglomerate, 5-6 mm. high and broad; bracts of the pistillate heads linear-oblong to lanceolate, greenish straw-colored, the inner acute, those of the staminate heads oval or elliptic, rounded at the apex. *A. parvifolia* Greene, not Nutt. *A. formosa* Greene, a large form. *A. solstitialis* Lunell., is the staminate plant, which is smaller. Dry hills and plains: Sask.—Neb.—N.M.—B.C.—Yukon. *Plain—Subalp.* Je-Jl.

27. *A. bracteosa* Rydb. Stem 3-4 dm. high, strict; leaves of the rosettes spatulate, petioled, about 2 cm. long, acutish or mucronate, white-tomentose, with a fine, silky tomentum; stem-leaves about 3 cm. long, oblong or narrowly oblanceolate; heads corymbose; involucre 7-8 mm. high, 5-6 mm. broad; bracts of the pistillate heads oblong or lanceolate, acute, or the inner acuminate, those of the staminate heads oval and obtuse or rounded at the apex. *A. parvifolia bracteosa* A. Nels. Mountain meadows: *Mont.—Colo. Submont.—Subalp.* Je-Jl.

28. *A. oxyphylla* Greene. Stem 2-4 dm. high; leaves of the rosettes spatulate-obovate or broadly oblanceolate, densely white-tomentose beneath, less so above; heads many in a rounded corymb; involucre 6-7 mm. high; bracts of the pistillate heads with dull white tips, the outermost ovate, obtusish, the rest lanceolate to linear-lanceolate, acute; staminate plant unknown. Hills and mountains: *Mont.—Ida.—Wyo.—Neb.—S.D. Plain—Submont.* My-Jl.

29. *A. obovata* E. Nels. Stem 2-3 dm. high; leaves of the rosettes about 3 cm. long, obovate-cuneate, permanently tomentose on both sides; stem-leaves small, oblong-linear; heads 3-7, corymbose; involucre about 8 mm. high; bracts of the pistillate heads oblong to linear-lanceolate, with a purplish brown spot, acute or acuminate, or the outermost obtusish. Hills and mountains. Man.—S.D.—Colo.—Alta. *Plain—Submont.* Je-Jl.

30. *A. aprica* Greene. Stem low, less than 1.5 dm. high; leaves of the rosettes spatulate or cuneate-oblanceolate, 1-2 cm. long, densely tomentose on both sides; stem-leaves linear, 1 cm. long, acute; heads 3-6, sessile or nearly so, conglomerate; involucre of the pistillate head 7-9 mm. high; bracts numerous, usually with a brown spot and white or pinkish tips, oblong, obtuse, or acutish; involucre of the staminate heads 6-7 mm. high; bracts oval or elliptic-obtuse. (?) *A. parvifolia* Nutt. *A. Holmii*, *A. obtusa*, *A. modesta*, and *A. pumila* Greene. Plains, hills, and mountains: Man.—Neb.—N.M.—Utah—B.C. *Plain—Subalp.* My-Jl.

31. *A. Howellii* Greene. Stem 2-4 dm. high; leaves of the rosettes cuneate-obovate, acute or acutish, 3-5 cm. long, glabrous above, closely silky-tomentose beneath, petioled; stem-leaves small and linear; heads several, corymbose; involucre of the pistillate heads 8-10 mm. high and nearly as broad; outer bracts oblong, the inner linear-lanceolate, very acute, all more or less brownish below. Hillsides and open woods: Alta.—Mont.—Ida.—Wash.—B.C. *Submont.—Mont.* My-Jl.

32. *A. campestris* Rydb. Stem low, about 1 dm. high or less; leaves of the rosettes obovate-cuneate, 2-4 cm. long and about 1 cm. wide, glabrate above, tomentose beneath; stem-leaves small, linear, acute; heads 3-6, sessile, conglomerate; involucre of the pistillate heads 8-9 mm. high, outer bracts oblong, obtuse, the inner linear-lanceolate, acute or acuminate; staminate involucre 6-7 mm. high; bracts elliptic or obovate, rounded. *A. Lunellii* and *A. alhabascensis* Greene. Prairies: Man.—Mich.—Mo.—Kans.—Sask.—(? B.C.). Plain. My-Je.

33. *A. marginata* Greepe. Stem 1-2 dm. high; leaves spatulate or oblanceolate, obtuse or mucronate, 1-2.5 cm. long, glabrate above, densely but loosely white-tomentose beneath; heads 4-8, conglomerate, but short-pedicelled; involucre of the pistillate plant 8-10 mm. high; outer bracts oblong, obtuse, the inner linear-lanceolate, acute; involucre of staminate heads 6-7 mm. high; bracts obovate or rhombic-obovate, obtuse, acutish or abruptly short-acuminate. Hills and mountain sides: N.M.—s Colo.—Utah—Ariz. *Submont.*—*Mont.* Je-Jl.

34. *A. rosulata* Rydb. Plant almost acaulescent; stem 1 cm. long or less; leaves of the rosettes 5-10 mm. long, spatulate or spatulate-obovate, densely and closely silvery-tomentose; heads 1-3 together, sessile; involucre of the pistillate heads lanceolate, acute, milky white, those of the staminate ones oval or obovate, rounded. *A. Bakeri* Greene. Mountains: Colo.—Utah—Ariz. *Submont.*—*Mont.* My-Jl.

35. *A. Sierra-Blancae* Rydb. Rosulate, almost stemless; leaves broadly spatulate, less than 1 cm. long, abruptly acute; heads subsessile in the rosettes, 6-7 mm. in diameter; bracts broadly oblong to almost obovate, with a scarious brown upper portion. High mountains: s Colo. *Alp.*

36. *A. oblanceolata* Rydb. Stem 2-4 dm. high, slender; basal leaves 3-6 cm. long, evidently 3-ribbed, densely white-tomentose; upper stem-leaves linear; heads corymbose; involucre 4-5 mm. high; bracts brownish, with white or straw-colored tips, those of the pistillate heads oblong to linear, the outer obtuse, the inner acute, those of the staminate heads oval and rounded. Mountain sides: Mont.—Colo.—Calif.—B.C. *Submont.*—*Mont.* Je-Au.

37. *A. luzuloides* T. & G. Stem 2-4 dm. high; leaves 5-7 cm. long, 1-4 mm. wide, densely silky white-tomentose; heads numerous, corymbose; involucre 4-5 mm. high, nearly glabrous throughout; bracts of the pistillate heads brownish and shining, the outer ovate, the inner linear-oblong, mostly obtuse, those of the staminate heads broader, rounded and white-tipped. Valleys and hillsides: Mont.—Wyo.—Ore.—B.C. My-Jl.

38. *A. lanata* (Hook.) Greene. Basal leaves narrowly oblanceolate, 4-8 cm. long, loosely white-tomentose; stem-leaves linear; heads several, conglomerate; involucre densely tomentose below, those of the pistillate heads 6-8 mm. high, those of the staminate 5-6 mm. high; bracts of the former in 5 or 6 series, dark brown or almost black with light brown tips. High mountains: Alta.—Mont.—Ore.—B.C. *Mont.*—*Alp.* Je-Au.

39. *A. pulcherrima* (Hook.) Greene. Stem 3-5 dm. high; basal leaves oblanceolate, 8-12 cm. long; stem-leaves narrower; heads several, corymbose; involucre of the pistillate heads nearly 1 cm. high, more or less turbinate; bracts in 6 or 7 series, the outer broadly ovate, obtusish, the inner narrowly lanceolate, acuminate, all with dark brown bases and light brown or dirty white tips; staminate involucre 5-6 mm. high; bracts with rounded obovate tips. *A. carpathica pulcherrima* Hook. Hillsides and mountains: Sask.—Colo.—Wash.—Yukon. *Submont.*—*Subalp.*

40. *A. anaphaloides* Rydb. Stem 3-4 dm. high, stout; basal leaves narrowly oblanceolate, 10-15 cm. long, acute; heads many in an open corymb; involucre of the staminate and pistillate heads much alike, 6-8 mm. high; bracts in 3-4 series, with white tips, in the pistillate heads obtuse or acutish, in the staminate heads rounded or truncate at the apex. *A. pulcherrima* Coult. & Nels., not Greene. Hillsides: Mont.—Colo.—Ore.—B.C. *Submont.*—*Subalp.* My-Au.

41. *A. dimorpha* (Nutt.) T. & G. Pulvinate-cespitose perennial; stem 1-3 dm. high; leaves 1-2 cm. long; heads solitary; involucre of pistillate heads 1-1.5 cm. high, turbinate, tomentose at the base only; outer bracts ovate, acute, the inner narrowly linear-lanceolate, attenuate; involucre of the staminate heads more hemispheric, 6-7 mm. high; bracts oblong, obtuse, darker brown. Dry plains: Mont.—Neb.—Colo.—Calif.—B.C. *Plain—Submont.* Ap-Jl.

42. *A. macrocephala* (D. C. Eat.) Rydb. Pulvinate-cespitose perennial; stem 2-5 cm. high; leaves 1.5-3 cm. long; involucre of the pistillate heads turbinate, 18-20 mm. high; outer bracts ovate, the inner narrowly linear-lanceolate, scarious-margined, brownish on the back; involucre of the staminate heads about 8 mm. high; bracts elliptic to ovate, often acutish. *A. dimorpha macrocephala* D. C. Eat. Bench-lands: Utah. *Son.—Submont.* Ap-My.

43. *A. flagellaris* (T. & G.) A. Gray. Pulvinate perennial with a small caudex, producing filiform ascending stolons, 5-10 cm. long, which bear at their apex a rosette of small leaves; basal leaves narrowly linear, grayish-tomentose; stem 1-2 cm. long, few-leaved; heads solitary; involucre of the staminate heads 6-7 mm. high, tomentose at the base; bracts dark brown, oblong-obtuse; involucre of the pistillate heads 8-10 mm. long; bracts lanceolate to linear-lanceolate, acute. Mountains: n Wyo.—Wash.—Ore. *Submont.—Subalp.* Je-Jl.

56. ANAPHALIS DC. PEARLY EVERLASTING.

Tomentose, perennial, caulescent herbs with rootstocks. Leaves alternate, narrow, sessile. Heads discoid, polygamo-dioecious. Involucre hemispheric; bracts imbricate in several series, pearly-white; receptacle convex, not chaffy. Pistillate heads usually with a few hermaphrodite flowers in the center. Pistillate corollas filiform, their pistils with distinct style-branches. Hermaphrodite flowers with tubular, 5-toothed corollas, and undivided styles, sterile. Pappus bristles capillary, falling off separately. [*Nacrea* A. Nels, based on a staminate plant.]

Leaves narrowly linear, 1-nerved; heads about 5 mm. high 1. *A. angustifolia*.
Leaves linear-lanceolate to oblong-lanceolate, 3-nerved, heads 6-7 mm. high.
Leaves comparatively thin, less tomentose above 2. *A. subalpina*
Leaves comparatively thick, almost equally white-tomentose on both sides. 3. *A. lanata*.

1. *A. angustifolia* Rydb. Stem slender, strict, 3-6 dm. high; leaves 5-10 cm. long, 2-5 mm. wide, densely white-tomentose beneath, less so above, glabrate in age; inflorescence small, corymbose; bracts elliptic, obtuse or acutish. Wooded slopes: Mont.—B.C. *Submont.* Jl-Au.

2. *A. subalpina* (A. Gray) Rydb. Stem 3-4 dm. high; leaves 3-8 cm. long, 5-15 mm. wide, densely white-tomentose beneath; inflorescence corymbiform; bracts pearly-white, broadly ovate, mostly acute. *A. margaritacea subalpina* A. Gray. Open mountain woods: Alta.—S.D.—Colo.—Utah—B.C. *Submont.—Subalp.* Je-Au.

3. *A. lanata* (A. Nels.) Rydb. Stem strict, 2-4 dm. high; leaves densely lanate on both sides, ascending, sessile and clasping, oblong-lanceolate, 4-6 cm. long, 10-15 mm. wide, mucronate; inflorescence corymbiform, high; bracts pearly white, ovate or obovate, obtuse or acutish. *Nacrea lanata* A. Nels. Mountains: Wyo. *Mont.* Jl-S.

57. GNAPHALIUM L. CUDWEED, EVERLASTING.

Annual, biennial, or perennial caulescent herbs, with woolly or sometimes glandular foliage. Leaves alternate, entire, narrow. Heads discoid, glomerate or paniculate in our species. Involucre campanulate or hemispheric; bracts scarious, imbricate in several series; receptacle not chaffy, usually pitted. Marginal flowers pistillate, fertile, in several series, with filiform corollas. Central flowers hermaphrodite, few, with tubular corollas. Pistils in all the flowers with 2 distinct stigmas. Anther sagittate at the base. Achenes terete or slightly flattened. Pappus of capillary bristles, distinct or united at the base, deciduous.

Bristles of the pappus not united at the base, falling off separately.

Heads not leafy-bracted, involucre bracts well imbricate, scarious, white or tinged with brownish, rose, or yellow; plants mostly tall

Leaves tomentose on both sides, plants little if at all glandular, involucre tomentose at the base

Stem-leaves narrowed at the base, neither decurrent nor clasping

Perennial or biennial, stem 3-5 dm. high, inflorescence open, bracts white.

1 *G. Wrightii*

Annual, stem 1-2 dm. high; inflorescence dense, bracts yellowish

2 *G. thermale*

Stem-leaves not narrowed at the base, more or less decurrent, or at least auricled-clasping.

Leaves with short broad adnate auricles at the base, bracts obtuse

Heads 5-6 mm. high, numerous, in glomerules ending the short spreading branches; bracts slightly if at all yellowish, plant tall; stem-leaves lanceolate or oblong, with rounded bases, cuspidate

3 *G. proximum*

Heads 4 mm. high, few, in small glomerules, ending the stem or few erect branches, bracts decidedly yellowish when young; plant low, leaves oblong to linear, merely acute or obtuse

Stem erect, strict, lower stem-leaves oblong-oblancoelate

4 *G. sulphurescens*.

Stem decumbent at the base; lower stem-leaves spatulate.

5 *G. lagopodioides*

Leaves distinctly decurrent, bracts acutish, heads 4-5 mm. high

Bracts broadly ovate, inflorescence corymbiform. 6 *G. Williamsii*

Bracts lance-ovate, inflorescence narrow. 7 *G. microcephalum*

Leaves on the upper surface green and decidedly glandular, decurrent, involucre glabrous. 8 *G. Macounii*

Heads leafy-bracted, involucre bracts little imbricate, brown or greenish; plant low, involucre floccose at the base

Plants loosely floccose, leaves broad, spatulate, oblong or oblanceolate

9 *G. palustre*

Plants appressed-tomentose, leaves except the lowest narrowly oblanceolate or linear

Stem diffusely branched; glomerules crowded, cymosely disposed

Upper leaves narrowly oblanceolate

10 *G. uliginosum*

Upper leaves narrowly linear

11 *G. exilisfolium*

Stem mostly simple, erect; glomerules spicately disposed

12 *G. Grayi*.

Bristles of the pappus united in a ring at the base and falling off together; leaves oblanceolate or spatulate.

13 *G. ustulatum*

1. *G. Wrightii* A. Gray. Biennial or perennial, with a taproot; stem upright, much branched above, white-floccose throughout; leaves oblanceolate or spatulate, 2-4 cm. long, the uppermost linear; heads numerous in a rather open panicle; involucre 5-6 mm. high; bracts white, oblong, abruptly pointed, pearly white. *G. albatum* Osterh. Dry grounds: Colo.—N.M.—Calif. *Submont.* Au-O.

2. *G. thermale* E. Nels. Annual; stem low, branched from the base, grayish-tomentose; basal leaves oblanceolate, about 3.5 cm. long; stem-leaves narrowly oblanceolate to linear, 1-3 cm. long; heads sessile in small glomerules, terminating the branches; involucre 4-5 mm. high, bracts dull white or yellowish, the outer ovate, the innermost linear, abruptly apiculate. *G. Wrightii* Coult. & Nels., not A. Gray. Hot-spring formations. n Wyo. *Mont.* Jl.

3. *G. proximum* Greene. Biennial or annual, with a taproot, branched at the base; stem 3-6 dm. high, very leafy; basal leaves spatulate or oblanceolate, 3-4 mm. long; inflorescence closely paniculate, leafy-bracted; involucre villous, 5-6 mm. high; bracts straw-colored or ochroleucous, obtuse. Perhaps scarcely distinct from *G. Chilense* Spreng. Wet places: Wyo.—Utah—Nev.—Wash. *Submont.*—*Mont.* Jl—Au.

4. *G. sulphurescens* Rydb. Annual or biennial; stem usually simple, 2-4 dm. high, often yellowish above; basal leaves spatulate, 2-3 cm. long, white-woolly; stem-leaves linear or the lower oblong-spatulate, mostly erect; heads sessile in small glomerate cymes; involucre 4-5 mm. high; bracts elliptic or oval, very obtuse, yellow, glossy. *G. luteo-album* Hook., not L. Wet sandy soil. *Mont.*—Tex.—N.M.—Wash. Jl—N.

5. *G. lagopodioides* Rydb. Biennial, usually branched at the base; stem about 1 dm. high, densely woolly-tomentose; basal leaves spatulate, 1-1.5 cm. long, loosely woolly; stem-leaves oblong-spatulate or the lower obovate-spatulate; heads in small conglomerate cymes; involucre about 4 mm. high; bracts oblong

or elliptic, sulphur-yellow, glossy. Perhaps scarcely distinct from the preceding. Geyser formations: n Wyo. *Mont.* Au-S.

6. *G. Williamsii* Rydb. Probably biennial; stem 3-6 dm. high, branched above, loosely floccose; leaves linear or linear-lanceolate, decurrent, 5-10 cm. long; inflorescence large, corymbosely paniculate; involucre 6 mm. high, only slightly tomentose at the base; bracts broadly ovate, acute, light straw-colored or white. Woods: *Mont.* *Mont.* Au.

7. *G. microcephalum* Nutt. Perennial, with a taproot; stem slender, 3-5 dm. high, simple below; leaves linear or the lower oblanceolate, densely floccose; inflorescence a narrow panicle; involucre campanulate, 4-5 mm. high; bracts straw-colored to pearly-white, lance-ovate, acute. Along streams: Calif.—Ida.—B.C.

8. *G. Macounii* Greene. Biennial, with a taproot; stem 5-8 dm. high, corymbosely branched above, glandular-pubescent, loosely tomentose above; leaves numerous, lanceolate to linear, white-tomentose beneath, 5-10 cm. long; heads numerous; involucre hemispheric, glabrous, about 5 mm. high; bracts ovate or the inner lanceolate, all acute, white or straw-colored, turning rusty. *G. decurrens* Ives, not L. *G. Ivesii* Nels. & Macbr. Open ground: N.S.—Pa.—N.M.—Ariz.—B.C. *Plain*—*Submont.* JI-S.

9. *G. palustre* Nutt. A low spreading annual; stem at first erect, later diffusely branched, with spreading branches, 5-20 cm. high; leaves 1-2 cm. long; involucre 3-4 mm. high; bracts oblong to linear, brown, or the inner with white tips. Wet places: Alta.—Neb.—N.M.—Calif.—B.C. *Plain*—*Submont.* My-Au.

10. *G. uliginosum* L. Annual; stem at first simple, erect, later diffusely branched, with ascending or spreading branches, 5-20 cm. long; leaves 2-4 cm. long, 3-4 mm. wide; bracts oblong to linear, mostly acute, brown. Wet places: Newf.—Va.—Colo.—Utah—Ore.—B.C.; n Eu. *Plain*—*Mont.* JI-Au.

11. *G. exilifolium* A. Nels. Low annual; stem branching at the base; branches decumbent or adscurgent, 8-12 cm. long, sparingly floccose; leaves 2-4 cm. long; involucre about 3 mm. high; bracts lanceolate, acute, brown below, white-tipped. *G. angustifolium* A. Nels., not Lam. Wet places: Colo.—Wyo. *Submont.*—*Mont.* JI-S.

12. *G. Grayi* Nels. & Macbr. Strict and simple annual; stem 1-3 dm. high, appressed-tomentose; leaves all linear, appressed-tomentose, 1-4 cm. long; involucre about 3 mm. long; bracts oblong to linear, wholly brown, or the innermost with lighter tips, obtuse. *G. strictum* A. Gray, not Moench. Wet places: Wyo.—N.M.—Ariz. *Submont.*—*Mont.* Au-S.

13. *G. ustulatum* Nutt. Perennial, with a short rootstock; stem 1-3 dm. high, loosely floccose; leaves 2-8 cm. long, rather loosely floccose on both sides, white beneath, greener above; glomerules of the heads arranged in a narrow dense spike-like panicle; involucre about 5 mm. long; bracts ovate, abruptly short-cuspidate, brown, shining. Closely related to *G. purpureum* of the Atlantic States. In saline soil: B.C.—Mont.—Calif. Ap-JI.

58. ADENOCAULON Hook.

Perennial herbs, with rootstocks. Leaves alternate, with winged petioles and dilated blades. Inflorescence paniculate, the peduncles beset with stalked glands. Heads many-flowered, discoid. Involucre turbinate of few thin herbaceous bracts. Marginal flowers pistillate, 4-lobed or somewhat 2-lipped. Central flowers hermaphrodite, sterile, broadly funnelform, deeply 4-5-cleft, all white. Anther sagittate and the auricles minutely caudate. Achenes obovoid or clavate, very obtuse, with stipitate glands above. Pappus none.

1. *A. bicolor* Hook. Stem erect, 3-10 dm. high, more or less floccose; leaf-blades deltoid-cordate, 5-10 cm. long, sinuate-dentate or somewhat lobed, soon green and glabrate above, densely white-tomentose beneath; involucre 2.5-3 mm. high, turbinate; bracts 4 or 5, ovate, acute, reflexed in fruit; achenes 4-6,

elavate, 7-8 mm. long. Damp woods: B.C.—Calif.—Mont.—Lake Superior. *Mont.* Je—Au.

59. MELAMPÓDIUM L.

Annuals or perennial herbs or shrubs. Leaves opposite, often narrow, entire, toothed or pinnatifid. Heads radiate. Involucres double, the outer of 4-5, partially united flat bracts, the inner of a series of bracts, each embracing an achene, and deciduous with it. Receptacle convex or conic. Ray-flowers in one series, pistillate, white or yellow. Disk-flowers hermaphrodite, but sterile. Anthers entire at the base. Achenes broadened upwards, somewhat incurved. Pappus wanting.

1. *M. leucanthum* T. & G. Perennial, with a taproot and short caudex; stems several, branched below, 1-3 dm. high, cinereous-strigose; leaves linear or the lower oblanceolate, 3-5 cm. long, entire or sinuately lobed; involucres about 5 mm. high and fully 1 cm. broad, cinereous; ligules white, about 1 cm. long and 5 mm. wide. Dry plains: Tex.—Colo.—Ariz. *Plain*—*Submont.* Mr—O.

60. SÍLPHIUM L. ROSINWEED, COMPASS PLANT.

Large perennial herbs, often with resinous sap. Leaves alternate. Heads radiate. Involucres hemispheric or campanulate; bracts broad, in few series. Receptacle flat, with numerous paleae. Ray-flowers pistillate, in 2 or 3 series, fertile; ligules yellow, rarely white. Disk-flowers hermaphrodite but sterile; corollas yellow. Anthers 2-toothed at the base or entire. Achenes flat and broad, 2-winged, notched at the apex. Pappus wanting or of 2 small awns.

1. *S. integrifolium* Michx. Stem 8-15 dm. high, rough-pubescent, 4-angled; leaves mostly sessile, ovate to lanceolate, entire or dentate, 7-12 cm. long, scabrous; involucre 1-1.5 cm. high; bracts triangular-ovate to lanceolate, acute, or the inner obtuse; ligules 15-23, yellow, 2-3 cm. long. Rosinweed Prairies: Mich.—Miss.—Tex.—Colo.—Minn. *Plain.* Au—S.

61. ENGELMÁNIA T. & G.

Perennial herbs, with alternate pinnatifid leaves. Heads radiate. Involucres hemispheric, or campanulate; bracts of 2 or 3 series, the outer narrow, the inner broad. Receptacle flat, chaffy. Ray-flowers 8-10, pistillate, fertile; ligules yellow. Disk-flowers hermaphrodite, but sterile, partly embraced by the paleae. Anthers 2-toothed at the base. Achenes flat, broader upwards, 1-ribbed on each side. Pappus an irregular crown.

1. *E. pinnatifida* T. & G. Stem 3-7 dm. high, hirsute or hispid; leaves 5-15 cm. long, pinnatifid, the upper sessile; outer bracts linear, the middle ones sub-orbicular, with linear tips, and the inner oval or obovate, ciliate; ligules 8-10, golden yellow, 1 cm. long. Plains and hillsides. La.—Kans.—Colo.—Ariz. *Son.*

62. BOLÓPHYTA Nutt.

Acaulescent caespitose herbs. Leaves all basal, crowded, entire. Heads solitary, subsessile among the leaves, discoid. Involucres hemispheric; bracts few, broad, in about 2 series, herbaceous. Marginal flowers pistillate, few, without ligules; corollas truncate at the apex. Central flowers hermaphrodite and sterile, their corollas tubular-funnelform; anthers entire at the base; styles dilated, truncate and pubescent at the summit. Pappus a pair of oblong-lanceolate membranous scales.

1. *B. alpina* Nutt. Tufted, subacaulescent perennial, with a caespitose caudex, 2-5 cm. high; leaves basal, crowded, silvery-canescens, spatulate-linear, 2-3 cm. long, entire; heads solitary, subsessile, 7-8 mm. wide. *Parthenium alpinum* A. Gray. Among rocks: Wyo. *Submont.*

63. PARTHÉNICE A. Gray.

Annual herbs, with alternate leaves. Heads paniculate, discoid. Involucres hemispheric, double, the outer of 5 somewhat herbaceous broad bracts, the inner of 6-8 somewhat larger orbicular bracts more or less scarious, and subtending the

pistillate flowers. Receptacle convex, with a series of linear-oblong or spatulate paleae, subtending the outer series of the central flowers. Marginal flowers 6-8, pistillate and fertile, with an obliquely cleft corolla-tube. Central flowers hermaphrodite but sterile, 40-50, with funnelform corollas. Anthers entire at the base. Achenes oblong-obovate, glabrous, wingless, but acutely angled, with an incurved apiculation. Pappus wanting.

1. *P. mollis* A. Gray. Annual, with the odor of *Artemisia*; stem 1-2 m. high, paniculately branched; leaf-blades rhombic-ovate or the lower subcordate, 8-15 cm. long, acuminate, sinuately and often doubly dentate, cinereous-puberulent; involucre hemispheric, 3 mm. high and 4-5 mm. broad; corollas greenish white. Hillsides along streams: s Colo.—N.M.—Ariz. Son. Au-S.

64. CRASSINA Scep.in.

Annual or perennial herbs or shrubby plants. Leaves opposite, commonly narrow, entire or sparingly toothed. Heads radiate. Involucres campanulate to nearly cylindric; bracts in 3-5 series, firm, appressed, rather dry. Receptacle conic to nearly cylindric, chaffy. Ray-flowers pistillate, fertile; their ligules red, purple, or yellow, or variegated, in ours yellow, persistent and becoming papery. Disk-flowers hermaphrodite, fertile, enveloped in the paleae. Achenes various, those of the rays 3-angled, those of the disk-flowers flattened. Pappus of one to several teeth or awns, or lacking. [*Zinnia* L.]

Ligules large, much longer than the disk
Ligules scarcely longer than the disk

1. *C. grandiflora*.
2. *C. anomala*.

1. *C. grandiflora* (Nutt.) Kuntze. Perennial, with a woody root and short caudex; stem 1-2 dm. high, branched, puberulent; leaves linear, more or less distinctly 3-nerved, impressed-punctate, scabrous-hispidulous, 2-3 cm. long; heads solitary, short-peduncled; involucre 6-9 mm. high; ligules yellow, turning whitish, 12-15 mm. long; disk-corollas dark brick-red. *Zinnia grandiflora* Nutt Plains: Tex.—Kans.—Colo.—Ariz. Son.—Submont. My-S.

2. *C. anomala* (A. Gray) Kuntze. Perennial, with a woody rootstock and short caudex; stems numerous, 1-1.5 dm. high, puberulent; leaves linear, 2-3 cm. long, one-nerved or 3-nerved at the base, punctate and hispidulous-scabrous; involucre fully 1 cm. high, 5-7 mm. broad; ligules short and rounded, 5 mm. long or less, yellow or orange, often lacking; disk dark brick-red. Plains: Tex.—Colo.—n Mex. Son. Ap-Au.

65. HELIOPSIS L. OX-EYE.

Perennial or rarely annual, leafy-stemmed herbs. Leaves opposite, petioled, toothed. Heads radiate, corymbose or solitary. Involucres hemispheric or campanulate; bracts nearly equal, in 2-3 series, the outer herbaceous. Receptacle conic or convex, chaffy. Ray-flowers pistillate, fertile, with oblong yellow ligules, more or less persistent on the fruit. Disk-flowers numerous, hermaphrodite, fertile, enveloped by paleae. Stigmas with short conic hirsute appendages. Achenes 3-4-angled, truncate. Pappus none or reduced to a short, 1-4-toothed annular border.

1. *H. scabra* Dunal. Perennial, with a short crown and a fascicle of fibrous roots; stem 5-15 dm. high, more or less hispidulous-scabrous; leaf-blades ovate or subcordate, 5-10 cm. long, scabrous-hispidulous, strongly veined, triple-nerved, coarsely dentate; involucre 8-12 mm. high, 15-25 mm. broad, canescent; bracts oblong, obtuse, in 2 series, the outer usually longer; ligules 15-25 mm. long. Dry soil and river banks: Me.—N.Y.—N.M.—B.C. Plain—Submont.

66. BRAUNERIA Neck. PURPLE CONE-FLOWER.

Perennial caulescent herbs. Leaves mostly alternate, entire or toothed. Heads radiate, solitary or few, mostly long-peduncled. Involucres rather flat; bracts in 2-4 series, narrow, herbaceous, squarrose. Receptacle hemispheric, chaffy. Ray-flowers several, neutral, with rudimentary styles; ligules spreading

or drooping, purple or rose, seldom yellow or white. Disk-flowers hermaphrodite, fertile. Paleae awned, surpassing the flowers, persistent. Achenes acutely 4-angled. Styles with acute or obtuse, hispid appendages. Pappus a crown produced into a small tooth at each angle. [*Echinacea* Moench.]

1. **B. angustifolia** (DC.) Heller. Perennial, with a taproot; stem 3-6 dm. high, erect, hispid; lower leaves petioled, the upper subsessile; blades lanceolate to nearly linear, 3-ribbed, scabrous-hispidulous; involucre about 1 cm. high, 2-3 cm. wide; bracts lanceolate, hispid; ligules about 2-2.5 cm. long, light purple, spreading. *E. angustifolia* DC. Prairies: Sask.—Minn.—Tex.—Colo.—Mont. *Plain*. Je—Au.

67. GYMNOLOMIA H B.K.

Annual or perennial, caulescent herbs, or rarely shrubby plants. Leaves alternate or opposite, narrow, entire or toothed. Heads radiate, corymbose or paniculate. Involucre hemispherical; bracts narrow, herbaceous, in 2-3 series. Receptacle more or less conic, chaffy; paleae strongly concave or conduplicate, enclosing the disk-flowers. Ray-flowers neutral; ligules yellow. Disk-flowers hermaphrodite, fertile; corollas yellow or brownish. Achenes 4-angled, sometimes somewhat flattened, truncate. Pappus a denticulate crown or wanting.

Perennials.

Leaves lanceolate, caudex thick, lignescant.

Leaves linear; caudex slender.

Annuals, leaves linear.

Plant finely strigose.

Plant hispid.

1. *G. multiflora*.

2. *G. linearis*.

3. *G. annua*.

4. *G. ciliata*.

1. **G. multiflora** (Nutt.) Benth. & Hook. Perennial, with a taproot; stems several, 2-12 dm. high, striate and strigose; leaves lanceolate or linear-lanceolate, acutish, or some oblong and obtuse, 4-7 cm. long, 4-20 mm. wide, finely scabrous-puberulent; involucre 12-15 mm. broad; bracts linear-lanceolate, hirsute; ligules golden yellow, 10-15 mm. long; achenes smooth. Prairies and banks of streams: Mont.—N.M.—Calif.—Ida. *Plain—Mont.* Jl—S.

2. **G. linearis** Rydb. Perennial, with a rootstock or slender caudex; stem 3-4 dm. high, terete, strigose; leaves narrowly linear, 3-4 cm. long, 2-4 mm. wide, entire, hirsutulous, sparingly hispid-ciliate at the base; involucre about 6 mm. high, 12-15 mm. broad; bracts linear-lanceolate, canescent-strigose; ligules 10-12 mm. long, 3-4 mm. wide. Sandy soil: sw Utah. *L. Son.*

3. **G. annua** (M. E. Jones) Robins. & Greenm. Annual, with a taproot; stem branched from the base, 3-5 dm. high, copiously branched above; leaves linear, somewhat canescent, 4-7 cm. long, 2-3 mm. broad, those of the branches smaller; involucre 5 mm. high, 7-10 mm. broad; ligules yellow, 4-8 mm. long. *G. multiflora annua* M. E. Jones. Dry regions: Tex.—se Utah—Ariz.; n Mex. *L. Son.* S—N.

4. **G. ciliata** (Robins. & Greenm.) Rydb. Annual, with a slender taproot, usually branched from the base; stem 3-5 dm. high, sparingly hirsute; leaves linear, green, conspicuously hirsute-ciliate throughout; involucre about 5 mm. high, 8-10 mm. broad; bracts linear-lanceolate, hirsute-ciliate on the margins and midvein; ligules golden yellow, about 8 mm. long. *G. hispida ciliata* Robins. & Greenm. Dry regions: N.M.—s Utah—s Calif. *L. Son.*

68. RUDECKIA L. CONE-FLOWER, GOLDEN GLOW, NIGGER-HEADS.

Perennial, or rarely annual or biennial, caulescent herbs. Leaves alternate, entire, toothed, or pinnatifid, petioled or sessile. Heads radiate or discoid, many-flowered. Involucre hemispheric; bracts imbricate in 2 or more series, more or less foliaceous, loose and spreading. Receptacle convex, conic, or in fruit cylindrical, chaffy; paleae not spinescent. Ray-flowers neutral; ligules yellow, or partly or rarely wholly brown-purple or crimson, or none. Disk-flowers hermaphrodite, fertile; corollas with a short but manifest tube, 5-lobed. Style-branches with blunt or subulate pubescent tips. Achenes 4-angled, obtuse or truncate. Pappus a 4-toothed crown, a low border, or wanting.

Heads radiate; disk in fruit spherical or oblong.

Leaves entire or merely toothed, plant hispid.

Leaves except the uppermost 3-5-cleft or pinnatifid; plant glabrous or nearly so.

1. *R. hirta*

2. *R. ampla*

Heads discoid; disk in fruit cylindraceous.

Leaves pinnately parted

3. *R. montana*

Leaves undivided, toothed or entire

4. *R. occidentalis*

1. *R. hirta* L. Perennial; stem erect, usually straw-colored, 3-5 dm. high, usually purple-dotted, hirsute; lower leaves long-petioled; blades oblong-lanceolate or oblanceolate, 5-10 cm. long, entire or remotely denticulate, obtuse, 3-ribbed, hirsute; upper stem-leaves linear and subsessile; peduncles 5-15 cm. long; involucre 15-18 mm. high, 3-5 cm. broad; bracts oblong-linear, hispid; ligules yellow, 1.5-3 cm. long. *R. flava* T. V. Moore. Hillsides and plains: Que.—Fla.—Neb.—Colo.—B.C. *Plain—Mont.* Jl—Au.

2. *R. ampla* A. Nels. Perennial, with a rootstock and thick crown; stem 1-2 m. high, glabrous, striate, branched above; basal leaves large, long-petioled, pinnately 3-7-divided; divisions ovate or lanceolate, 2-3-cleft, and coarsely serrate, glabrous and slightly paler beneath, somewhat hairy above; upper stem-leaves 3-parted or entire, toothed, acuminate; involucre about 1 cm. high and 3 cm. wide; bracts very unequal, oblong or ovate-oblong, mostly obtuse, reflexed in age, 8-12 mm. long; ligules 3-5 cm. long, 8-15 mm. wide; disk ovoid in fruit; pappus coroniform, sometimes 4-toothed. Closely allied to the eastern *R. laciniata* L. Wet places: Sask.—N.M.—Ariz.—Ida. *Plain—Mont.* Jl—Au.

3. *R. montana* A. Gray. Perennial; stem 1-2 m. high, glabrous; lower leaves 2-3 dm. long, petioled, pinnately parted into 3-9 oblong-lanceolate divisions, glabrous, ciliate on the margins; upper stem-leaves ovate or lanceolate, acuminate, entire; peduncles 3 dm. long or more; involucre bracts linear, foliaceous, acute, 2-4 cm. long; disk cylindric, at length 5-6 cm. long, purplish black; pappus coroniform. Mountains: Colo. *Mont.* Jl.

4. *R. occidentalis* Nutt. Perennial; stem 5-20 dm. high, glabrous, striate; leaves ovate or ovate-lanceolate, acuminate, entire or dentate, the upper sessile with a cordate base, the lower with winged petioles, more or less hairy; peduncles 1-3 dm. long; bracts oblong or lanceolate, 1-2 cm. long; disk brownish black, oblong, becoming 3-5 cm. long; pappus coroniform. Shaded banks: Mont.—Wyo.—Utah—e Calif.—Wash. *NIGGER-HEADS. Submont.—Mont.* Jl—S.

69. RATIBIDA Raf. CONE-FLOWER.

Annual, biennial, or perennial caulescent herbs. Leaves alternate, pinnatifid with narrow divisions. Heads radiate, long-peduncled. Involucre many-flowered, rather flat. Ray-flowers neutral; ligules yellow, or partly brown at the base, rarely wholly brown-purple, spreading or drooping. Disk-flowers hermaphrodite, perfect, usually enveloped by the paleae; corollas gray or yellowish, almost without a tube. Style-branches with blunt or lanceolate tips. Achenes flattened, broad-margined or winged, deciduous with the scale. Pappus 1 or 2 teeth, or wanting. [*Lepachys* Raf.]

Disk in fruit oblong, about 1 cm. long; pappus of 1-2 awn-like teeth, without intermediate squamellae

1. *R. Tagetes*

Disk in fruit cylindraceous, 2-4 cm. long; pappus with a series of squamellae.

2. *R. columbifera*

1. *R. Tagetes* (James) Barnh. Perennial, with taproot; stems several, branched, 2-4 dm. high, grayish-strigose; leaves pinnately divided, with 3-7 linear divisions, hispidulous; heads rather short-peduncled; bracts reflexed, oblong, 3-5 mm. long; ligules 7-10 mm. long; receptacle about 1 cm. high in fruit. *L. Tagetes* A. Gray. Plains: Tex.—Kans.—Colo.—Ariz. *Plain—Submont.* Jl—Au.

2. *R. columbifera* (Nutt.) Woot. & Standl. Perennial, with a taproot; stems often several, 3-6 dm. high, hispidulous-strigose, angled; leaves pinnately divided, hispidulous; divisions of the stem-leaves 5-9, oblong to linear, entire or rarely 2-3-cleft; heads long-peduncled; involucre bracts oblong, 5-8 mm. long, soon spreading; ligules yellow or in the variety *pulcherrima* partly or wholly

brown-purple, 1-3 cm. long; receptacle in fruit 2-4 cm. long. *L. columnaris* (Sims) T. & G. Plains: Sask.—Tenn.—Tex.—Ariz.—B.C. Plain—Submont. My-S.

70. GALINSOGA R. & P.

Annual leafy-stemmed herbs. Leaves opposite, petioled, toothed. Heads radiate, small. Involucre campanulate or hemispheric; bracts imbricate in 2 series, thin. Receptacle conic, chaffy. Ray-flowers few, pistillate, fertile; ligules short, white. Disk-flowers hermaphrodite, fertile. Anthers sagittate at the base. Style-branches with acute appendages. Achenes 4-5-angled or those of the rays slightly flattened. Pappus of the ray-flowers of several bristles or wanting, that of the disk-flowers of lacerate or fimbriate squamellae.

1. *G. parviflora* Cav. Stem 1-7 dm. high, branched; leaf-blades hispidulous or glabrous, ovate or ovate-lanceolate, 2-5 cm. long, dentate or undulate; involucre 2-2.5 mm. high; bracts ciliate, ovate; ligules 4 or 5, only 1-1.5 mm. long; pappus-squamellae in the disk-flowers 8-15. Waste places: Mass.—Ga.—Mex.—Ore.; nat. from S. Am.

71. BALSAMORRHIZA Hook. BALSAM-ROOT.

Low perennials, with almost scapose stems, numerous petioled basal leaves, and a thick edible root, its bark exuding a terebinthine balsam. Involucre mostly hemispherical; bracts in several series, more or less foliaceous, especially the outer ones. Receptacle almost flat, beset with concave paleae, which loosely embrace the disk-flowers. Ray-flowers present, fertile; ligules yellow. Disk-flowers hermaphrodite, fertile. Anthers not caudate. Style-branches with filiform or slender subulate hispid appendages. Achenes mostly glabrous, those of the disk-flowers quadrangular with intermediate nerves, those of the ray-flowers flattened. Pappus none.

Leaves entire or bluntly toothed, never pinnatifid

Plant white-tomentose.

Leaves with entire margins or slightly undulate, oblong-cordate to hastate

Leaves more or less distinctly toothed, ovate-lanceolate, with subcordate base

Plant hirsute-puberulent; basal leaves cordate

Ligules linear, deciduous, achenes glabrous

Ligules oval, becoming papery, and more or less persistent; achenes puberulent

Leaves mostly pinnatifid or at least incisedly toothed

Plant canescent or white-tomentose

Plants loosely white-tomentose

Stem 1-3 dm. high; segments of the leaves 1-3 cm. long, ovate, entire or slightly toothed.

Stem 3 dm. or more high; segments of the leaves 3-5 cm. long, lanceolate, coarsely toothed.

Plant finely canescent, tomentose only on the involucre; some of the leaves merely toothed.

Plants more or less hispid, neither canescent nor tomentose.

Disk 3-4 cm. broad, segments of the leaves mostly entire.

Disk 2-2.5 cm. broad, segments of the leaves mostly toothed.

1. *B. sagittata* (Pursh) Nutt. Leaves mostly basal, long-petioled; blades from cordate to hastate or sagittate, mostly entire, white-tomentose on both sides, 1-2 dm. long; peduncles 3-5 dm. high, tomentose; involucre floccose, about 2 cm. high and 2.5 cm. broad; bracts lanceolate or linear-lanceolate, usually all appressed; ligules 2-3 cm. long, 8-10 mm. broad, oblong. Hillsides: Sask.—S D.—Colo.—Calif.—B.C. Submont.—Mont. Ap.

2. *B. tomentosa* Rydb. Basal leaves with long petioles; blades about 12 dm. long, ovate-lanceolate, with subcordate bases, 15-20 cm. long, acute, coarsely toothed; stem 3-4 dm. high; involucre densely floccose, over 2 cm. broad; outer bracts usually half longer than the inner, and reflexed; ligules about 3 cm. long and 1 cm. wide. Hills: Wyo. Submont.—Mont. JI-Au.

3. *B. deltoidea* Nutt. Basal leaves numerous, long-petioled; blades cordate, hastate or deltoid, green, more or less pubescent, but not tomentose, 8-15 cm. long and almost as wide, coarsely dentate-crenate or sinuate or entire; heads

1-3; involucre 1.5-3 cm. high, slightly tomentose; bracts lanceolate, the outer foliaceous, exceeding the disk; ligules 2-4 cm. long, 4-8 mm. wide. Hills: B.C.—Ida.—Calif. *Submont.* Ap-Je.

4. **B. Careyana** A. Gray. Basal leaves long-petioled; blades cordate, entire, somewhat grayish scabrous-puberulent, subcoriaceous, reticulate, 1-1.5 dm. long; involucre 10-15 mm. high; bracts oblong-lanceolate or a few of the outer lanceolate and longer, all firm and puberulent; ligules broadly oval, 15-18 mm. long, 8-9 mm. wide, becoming papery and persistent; style-branches of the disk-flowers subulate and very hispid; achenes pubescent. Sandy plains: Ida.—Wash. *Son.* My.

5. **B. incana** Nutt. Leaves all basal, 1-1.5 dm. long, short-petioled, tomentose, pinnately divided into ovate, entire or slightly toothed divisions 1-3 cm. long; scape 1-2 dm. high; involucre floccose, 15-20 mm. high, 20-25 mm. broad; bracts lanceolate, appressed or the outer with spreading tips; ligules 2-2.5 cm. long, about 5 mm. wide. Dry hills: Wash.—Mont.—Wyo.—Calif. *Plain—Submont.* My-Jl.

6. **B. floccosa** Rydb. Leaves mostly basal, floccose on both sides, 2-3 dm. long, regularly pinnately divided to near the midrib or some sometimes only coarsely toothed; segments lanceolate, acute, 3-5 cm. long, coarsely toothed; stem scapiform, 3-5 dm. high, villous, the upper portion densely floccose; involucre about 3 cm. broad; bracts numerous in several series, lanceolate, the outer often spreading with recurved tips; ligules 3-4 cm. long, about 1 cm. wide. Hill-sides: Mont.—Wyo.—Ida. *Plain—Mont.* My-Jl.

7. **B. terebinthacea** (Hook.) Nutt. Leaves mostly all basal, short-petioled; blades 1-2 dm. long, lanceolate in outline, some of them only incised-toothed, others pinnately divided, hirsutulous-pubescent or glabrate; scape 1-3 dm. high; involucre 15-20 mm. high; bracts lanceolate, almost equal. In stony grounds and open woods: Ida.—Wash.—Ore. *Submont.* My-Je.

8. **B. macrophylla** Nutt. Stem 4-6 dm. high, sparingly villous-hirsute; basal leaves 2-5 dm. long, petioled, most of them pinnately divided into lanceolate divisions, but some occasionally only toothed; involucre 25 mm. high and 2.5-4 cm. broad; bracts linear-lanceolate, loose and the outer reflexed; ligules 3-5 cm. long, about 1 cm. wide. On dry hillsides: Utah—Wyo. *Submont.* My-Je.

9. **B. hirsuta** Nutt. Stem scapiform, sparingly villous-hirsute; leaves short-petioled, lanceolate in outline, pinnately divided; divisions ovate or lanceolate, coarsely toothed or again pinnatifid, strongly veined and rigid; involucre about 1.5 cm. high and 2 cm. broad; bracts linear-lanceolate, spreading, hirsute; ligules 15-20 mm. long, 4-6 mm. wide. On dry ground: Utah—B.C.—Calif. *Submont.* My-Je.

72. WYÉTHIA Nutt. MULE-EARS.

Stout and low perennial herbs, with thick taproot, balsamic juice, and alternate, commonly entire, pinnately veined leaves. Heads solitary or few. Involucre hemispheric or flat; bracts more or less imbricate, the outer often foliaceous. Ray-flowers pistillate and fertile; ligules yellow. Disk-flowers hermaphrodite and fertile; styles with slender, subulate hispid appendages. Paleae of the receptacle lanceolate, partly embracing the achenes. Achenes prismatic, 4-angled, somewhat flattened in the disk-flowers, or 3-angled in the ray-flowers. Pappus a lacerate chaffy crown or of almost distinct squamellae.

Involucral bracts nearly equal, in 2-3 series; stem not white.

Rays pale yellow or white, plant hispid.

Rays bright yellow.

Plant glabrous.

Plant pubescent.

Plant sparingly hirsute or scabrous.

Plant densely pubescent.

Involucral bracts unequal, the outer much shorter, in 5-6 series; stem white.

1^t. *W. helianthoides*.

2. *W. amplexicaulis*

3. *W. robusta*.

4. *W. arizonica*

5. *W. scabra*.

1. **W. helianthoides** Nutt. Stem 2-4 dm. high, more or less hirsute; leaves with margined petioles, more or less hirsute; blades of the basal leaves oval or

elliptic, 1-2 dm. long, those of the stem-leaves oblanceolate; heads solitary; involucre 2-2.5 cm. high, 5-6 cm. broad; bracts numerous, linear-lanceolate, acute or acuminate, hirsute-ciliate on the margins and back; ligules 2-4 cm. long; pappus coroniform or cleft into several teeth. Hills: Mont.—n Wyo.—Ore.—Wash. *Submont.* My-Jl.

2. **W. amplexicaulis** Nutt. Stem 3-6 dm. high, glabrous; basal leaves petioled, 3-4 dm. long; blades oblong, elliptic or lanceolate, denticulate or entire, glossy, reticulate, glabrous; upper stem-leaves lanceolate or ovate, sessile or somewhat clasping; involucre 2 cm. high, 2-4 cm. wide; bracts rather few, broadly lanceolate, acute, glabrous, firm; ligules 3-4 cm. long; pappus coroniform, but cleft into distinct teeth. Moist valleys: Mont.—Colo.—Utah—Ore.—B.C. *Submont.*—Mont. My—Au.

3. **W. robusta** Nutt. Stem decumbent at the base, 3-4 dm. high, sparingly hirsute; basal leaves 2-3 dm. long, short-petioled; blades oblanceolate, acute, sparingly hirsutulous or scabrous; stem-leaves lanceolate and sessile; involucre 1.5-2 cm. high, 3-4 cm. broad; bracts lanceolate, hirsute-ciliate on the margins and back; ligules 3-4 cm. long; pappus of a toothed crown and 1-4 stout awns. Valleys: Wash.—Ida.—Calif. *Son.* My-Jl.

4. **W. arizonica** A. Gray. Stem 3-5 dm. high, rather copiously hirsute-villous; basal leaves 2-4 dm. long, petioled; blades oblanceolate or oblong-oblanceolate, densely pubescent; upper stem-leaves sessile, ovate or lanceolate; involucre about 2 cm. high, 3-4 cm. wide; bracts oblong-lanceolate, acute, hirsute and finely puberulent; ligules 3-5 cm. long; crown of pappus with teeth, and 1 or 2 awns. Mountains, along streams: N.M.—Colo.—Utah—Ariz. *Submont.* My—Au.

5. **W. scabra** Hook. Stem leafy, hispidulous-scabrous, soon turning straw-colored or white; leaves linear, very scabrous, 5-8 cm. long, 6-12 mm. wide; involucre about 2 cm. high and 3 cm. broad; bracts linear-subulate, attenuate, hispid-ciliate and hirsute; ligules 2.5-4 cm. long; pappus of 3-4 blunt teeth. Dry plains: Wyo.—N.M.—Utah. *Son.*—*Submont.* Je-S.

73. HELIANTHUS L. SUN-FLOWER, GROUND ARTICHOKE.

Erect, mostly branched annuals or perennials, with simple leaves and large, peduncled, corymbose or solitary heads. Involucre hemispherical or depressed; its bracts imbricated in several series. Receptacle flat or convex, rarely conic, with paleae subtending the disk-flowers. Ray-flowers neutral; ligules yellow, spreading, mostly entire. Disk-flowers perfect, fertile; their corollas tubular, yellow, brown or purple. Anthers entire or minutely 2-toothed at the base. Style-branches with hirsute appendages. Achenes more or less 4-angled and somewhat compressed. Pappus of 2 scales or awns, sometimes with a few additional smaller intermediate ones, deciduous.

Annuals; leaves broad, ovate or cordate or lanceolate, disk purple or dark brown.

Bracts ciliate, hispid, ovate or obovate, abruptly acuminate.

Lower leaves at least ovate or cordate, distinctly toothed 1 *H. lenticularis*

Leaves lanceolate or narrowly deltoid, minutely toothed or entire.

2. *H. aridus*

3. *H. petiolaris*

Bracts not ciliate, canescent-strigose, lanceolate.

Perennials.

Disk dark brown or purple.

Leaves linear.

4. *H. orgyalis*

Leaves rhombic-ovate.

5. *H. subrhomboides*.

Disk yellow or light brownish.

Bracts broadly lanceolate, acute, appressed

6. *H. pumilus*

Bracts narrowly lanceolate, acuminate, more or less spreading

7. *H. tuberosus*.

Leaves ovate

Leaves lanceolate.

Leaves rounded or obtuse at the base, subsessile.

8. *H. divaricatus*.

Leaves tapering at the base, petioled

Stem more or less scabrous or hispid, upper leaves subsessile

Leaves and stem very scabrous.

9. *H. Maximiliani*

Leaves scabrous above, hirsute beneath; stem more or less hirsute.

Upper leaves mostly alternate and indistinctly triple-nerved.

10. *H. giganteus*.

Leaves usually all opposite, distinctly triple-nerved.

Leaves lanceolate, thick, often toothed, yellowish green, the lower distinctly petioled. 11. *H. sububerosus*.

Leaves linear-lanceolate, dark green, entire, all subsessile. 12. *H. cusickii*.

Stem, except the upper portion, glabrous and glaucous, leaves mostly all petioled.

Lower leaves coarsely toothed, bracts hirsute ciliate.

13. *H. grosse-serratus*. All leaves distantly and minutely denticulate or subentire; bracts not ciliate or ciliate merely at the base.

Leaves lanceolate, often somewhat triple-ribbed.

Leaves all opposite, bracts ciliate on the margins.

11. *H. sububerosus*. Leaves mostly alternate, bracts ciliate only below the middle.

14. *H. fascicularis*.

Leaves narrowly linear-lanceolate, not triple-ribbed.

15. *H. Nuttallii*.

1. *H. lenticularis* Dougl. Stem 1-2 m. high; leaves mostly alternate, the lower long-petioled; blades ovate, 1-2 dm. long, sometimes cordate at the base, dentate, hispidulous-scabrous, the upper more lanceolate, subentire; involucre 1.5-2 cm. high, 4-5 cm. broad; achenes grayish strigose, about 6 mm. long. Closely related to the cultivated *H. annuus*, which has larger, more nodding heads, looser bracts, more salient teeth to the leaves and larger achenes, often 1 cm. long. Plains and alluvial soil, also in waste places and cultivated ground: Sask.—Tex.—Calif.—Wash. Plain—Submont. Je-S.

2. *H. aridus* Rydb. Stem 3-8 dm. high, more or less hispid; leaves all petioled; blades lanceolate, 4-7 cm. long, entire or crenate, acute, hispid-scabrous on both sides; disk 1.5-2 cm. wide; ligules oblong to oval, 15-20 mm. long, 6-8 mm. wide; achenes cuncate, almost black, finely strigose, about 5 mm. long. Arid soil: Sask.—Neb.—N.M.—Ariz.—B.C. Plain—Submont. Je-S.

3. *H. petiolaris* Nutt. Stem 3-10 dm. high, hirsute-strigose; leaves petioled; blades lanceolate or ovate-lanceolate, mostly cuncate at the base, 5-8 cm. long, hispidulous-scabrous; involucre about 1 cm. high, 2-3 cm. broad; ligules golden yellow, 1.5-2 cm. long; achenes about 5 mm. long, strigose. Dry plains and waste places: Sask.—Mo.—Tex.—Calif.—B.C. Plain—Mont. Je-S.

4. *H. orgyalis* DC. Stem smooth and glabrous, 5-30 dm. high, very leafy; leaves mostly alternate, narrowly linear, 2-4 dm. long, 4-8 mm. wide, scabrous-puberulent; involucre fully 1 cm. high and about 2 cm. wide; bracts linear-subulate, long-attenuate, ciliate on the margins; rays 15-18 mm. long. Dry plains: Mo.—Tex.—e Colo. Plain. Au-S.

5. *H. subrhomboides* Rydb. Perennial, with a rootstock; stem 3-6 dm. high, terete, tinged with red, sparingly hirsute; leaves opposite; blades firm, very scabrous, triple-veined, serrate, the lower ovate or obovate-spatulate, the upper rhombic-ovate or rhombic-lanceolate, 5-10 cm. long; heads solitary, rarely 2 or 3, involucre 10-12 mm. high and 1.5-2 cm. broad; bracts in 4 or 5 series, oblong, acutish, white-ciliate; ligules about 1.5 cm. long. Plains: Man.—Ark.—N.M.—Alta. Plain—Submont. Jl-S.

6. *H. pumilus* Nutt. Perennial, with a woody crown; stem 3-6 dm. high, hispid; leaves opposite, short-petioled; blades ovate or lanceolate, entire or nearly so, acute or obtuse, 3-10 cm. long, very scabrous, hispid on the veins, 3-ribbed; involucre nearly 1 cm. high and about 2 cm. broad; ligules 15-20 mm. long. Plains and mountains: Wyo.—Colo. Plain—Submont. Je-Au.

7. *H. tuberosus* L. Perennial, with tubers; stem 1-3 m. high, branching at the summit, more or less hirsute; lower leaves usually opposite, the upper alternate, petioled; blades ovate or subcordate, acuminate, firm, 3-ribbed, scabrous above, pubescent beneath, 5-30 cm. long, usually dentate; involucre about 1.5 cm. high, 2-3 cm. broad; bracts lanceolate, attenuate, hirsute at least on the margins; ligules 12-20, 2.5-3.5 cm. long. Alluvial soil: N.S.—Ga.—Ark.—Neb.—Sask. Plain. Au-O.

8. *H. divaricatus* L. Perennial, with a rootstock; stem 3-10 dm. high, simple, smooth below, hispidulous-scabrous above; leaves opposite, subsessile,

divaricate, lanceolate or elongate-deltoid, 5-15 cm. long, gradually attenuate above, rounded at the base, 3-ribbed, scabrous on both sides; involucre about 1 cm. high and 2 cm. broad; bracts narrowly lanceolate, acuminate, hirsute-ciliate on the margins, hirsutulous on the back; ligules 8-12, about 2 cm. long. Dry ground: Que.—Fla.—La.—Sask. *Plain.* Jl-S.

9. *H. Maximiliani* Schrad. Perennial, with a thick rootstock; stem 5-30 dm. high, scabrous-hispidulous; leaves mostly alternate and subsessile, lanceolate to linear, entire or denticulate, 5-15 cm. long, 1-ribbed, very scabrous on both sides; heads many in a narrow panicle; involucre about 1.5 cm. high and 3 cm. wide; bracts lanceolate-subulate, long-attenuate, strigose-canescens or somewhat hispidulous; ligules golden yellow, 15-30 mm. long. Prairies, plains, and river banks: Man.—Mo.—Tex.—Wyo.—B.C. *Plain—Submont.*

10. *H. giganteus* L. Perennial, with a rootstock, some of the roots often becoming fusiform; stem 1-3 m. high, more or less hirsute; leaves lanceolate or oblong-lanceolate, 5-15 cm. long, scabrous above, hirsutulous beneath, short-petioled or subsessile, serrulate or denticulate, rarely entire; heads in an open panicle; involucre 12-15 mm. high and about 3 cm. broad; bracts linear-lanceolate, attenuate, hirsute-ciliate; ligules pale yellow, 1.5-2 cm. long. Low ground: Me.—Fla.—La.—Colo.—B.C. *Plain.* Au-S.

11. *H. subtuberosus* Bourgeau. Perennial, with tubers; stem 3-6 dm. high, glabrous or nearly so; leaves short-petioled, opposite; blades narrowly lanceolate, acute at both ends, finely serrate, scabrous-hispidulous above, hirsutulous beneath, 5-8 cm. long; involucre about 1.5 cm. high, 2.5-3 cm. wide; bracts linear-lanceolate or subulate, attenuate, hirsute, the outer spreading; ligules about 3 cm. long; disk yellow. Valleys and plains: Sask.—Minn.—Wyo.—Mont. *Plain.* Jl-Au.

12. *H. Cusickii* A. Gray. Perennial, with thick fleshy root; stem 3-6 dm. high, usually several; leaves subsessile, linear-lanceolate, hirsutulous, triple-veined; heads solitary; involucre 12-15 mm. high; bracts linear-lanceolate, attenuate, rather loose, hirsute; ligules about 2.5 cm. long. Dry sandy soil: Ore.—Wash.—Ida.—B.C. *Son.* My-Jl.

13. *H. grosse-serratus* Martens. Perennial; stem 1-3 m. high, glabrous and often purplish; leaves alternate, or some opposite, short-petioled; blades elongate-lanceolate, 1-2.5 dm. long, gradually acuminate, sharply serrate, slightly scabrous above, paler and short-pubescent beneath; heads in an open panicle; involucre about 1.5 cm. high, 2.5-3 cm. wide; bracts linear-subulate, attenuate; ligules golden yellow, 2-3 cm. long. Plains and prairies: N.Y.—Pa.—Tex.—N.M.—Utah—Sask. *Plain.* Au-S.

14. *H. fascicularis* Greene. Perennial, with a rootstock and fusiform thickened roots; stem glabrous and somewhat glaucous, 5-10 dm. high; leaves alternate or the lower opposite, 7-15 cm. long, short-petioled; blades lanceolate or linear-lanceolate, scabrous on both sides; heads in an open panicle; involucre about 1.5 cm. high and 3 cm. broad; bracts linear-subulate, attenuate; ligules 14-18, deep yellow, 2.5-3 cm. long; disk yellowish brown. *H. giganteus utahensis* D. C. Eat. *H. utahensis* A. Nels. (?) *H. coloradensis* Cockerell. Closely related to *H. subtuberosus* and *Nuttallii*. Mountain valleys: Sask.—N.M.—Ariz.—Alta. *Plain—Submont.* Au-S.

15. *H. Nuttallii* T. & G. Perennial; stem glabrous, strict, 3-8 dm. high, leaves alternate or opposite, linear or narrowly linear-lanceolate, 5-10 cm. long, entire or denticulate, scabrous-hispidulous on both sides; branches of the panicle erect; involucre about 1.5 cm. high, 2.5 cm. wide; bracts narrowly linear-subulate, attenuate, grayish hirsutulous, sparingly, if at all, ciliate at the base; ligules 2-2.5 cm. long. Dry plains: Alta.—Wyo.—Utah—Ida. *Plain.* Jl-S.

74. *ENCËLIA* Adans.

Annual or perennial herbs or shrubby plants, ours shrubs with white branches. Leaves alternate or opposite, mostly ovate. Heads radiate or rarely discoid, peduncled. Involucre hemispheric or flattened. Receptacle convex, chaffy.

Ray-flowers neutral, yellow, or none. Disk-flowers hermaphrodite, fertile; corollas yellow or brown. Anthers slightly sagittate at the base. Style-branches with elongated pubescent appendages. Achenes flattened, wingless. Pappus wanting (in ours) or a small awn at each angle of the achenes.

Leaves densely white-tomentose.
Leaves hispidulous-canescens.

1. *E. farinosa*.
2. *E. virginensis*

1. *E. farinosa* A. Gray. Shrub, 5-15 dm. high; leaves petioled; blades ovate, obtuse, 2-5 cm. long, triple-nerved, entire; heads nodding; involucre about 8 mm. high, 1-1.5 cm. wide; bracts lanceolate or linear-lanceolate, sparingly pilose or nearly glabrous, the outer reflexed; ligules 6-10, yellow, 8-12 mm. long; achenes obovoid, with a deep notch. Dry hills: Ariz.—s Utah—s Calif.; Mex. *L. Son.* N-My.

2. *E. virginensis* A. Nels. Shrub 3-10 dm. high; leaves alternate, short-petioled; blades broadly rhombic- or deltoid-ovate, triple-nerved at the base, 1-3 cm. long, hispidulous as well as canescent-puberulent; involucre 8 mm. high, 10-15 mm. broad; bracts hirsute-canescens, lanceolate, acute or acuminate; ligules 12-20, deeply 2- or 4-toothed, 15-20 mm. long; achenes linear-cuneate, slightly depressed at the apex, ciliate on the margins. Dry hills: s Utah—s Calif. *L. Son.* Ap-My.

75. ENCELIÓPSIS (A. Gray) A. Nels.

Silvery or canescent, often acaulescent scapose perennials. Heads radiate or in an anomalous species discoid. Involucre flat; bracts imbricate in 2-3 series. Receptacle chaffy. Ray-flowers neutral or lacking. Disk-flowers numerous, hermaphrodite and fertile; corollas yellow. Achenes flat, oblong-cuneate, villous, with narrow callous margins at the summit, bordered between the short subulate teeth by a short fringe of membranous confluent squamellae.

Plant white-tomentose, heads radiate

Stem scapiform, leaf-blades orbicular or spatulate; ligules 1-2 5 cm. long

Stem leafy, leaf-blades rhombic-obovate, ligules 3 5-4 cm. long.
Plant hispid-scabrous, heads discoid.

1. *E. nudicaulis*.
2. *E. argophylla*.
3. *E. nutans*.

1. *E. nudicaulis* (A. Gray) A. Nels. Acaulescent perennial, with a thick caudex; leaves all basal, petioled; blades thick, orbicular or rounded, spatulate, 1-5 cm. long and as broad, 3-5-ribbed; scape naked, 3-5 dm. high; involucre about 1.5 cm. high and 3 cm. wide; bracts lanceolate, white-tomentose; ligules 20 or more, 1-2 5 cm. long; pappus-awns scarcely exceeding the hairs. *Helianthella nudicaulis* A. Gray. *E. tula* A. Nels. Dry rocky ridges and alkaline soil: Ida.—Utah—Nev. *Son.* My-Je.

2. *E. argophylla* (S. Wats.) A. Nels. Perennial, with short leafy stem; leaves with winged petioles, 5-10 cm. long; blades rhombic-obovate, thick, 3-5-ribbed; involucre about 1.5 cm. high, 2.5-3 cm. wide; bracts tomentose, ovate-lanceolate, acuminate; ligules about 2.5 cm. long, 3-4 mm. wide; pappus-awns nearly as long as the corolla-tube. *Tithonia argophylla* S. Wats. *Helianthella argophylla* A. Gray. Alkaline soil: Nev.—s Utah. *L. Son.* Ap.

3. *E. nutans* (Eastw.) A. Nels. Subacaulescent perennial, with an erect woody caudex; leaves basal, petioled, clustered; blades oval or obovate, 3-5-ribbed, 2-4 cm. long, hispid-scabrous; heads deflexed in fruit; involucre about 18 mm. high, 2.5-3 cm. broad; bracts lanceolate, densely hispid; pappus none. *Encelia nutans* East. *Verbesina scaposa* M. E. Jones. Dry mesas: Colo.—Utah. *Son.* My.

76. HELIANTHELLA T. & G.

Cauliscent perennials, with taproots. Leaves alternate or opposite, more or less distinctly triple-ribbed. Involucre hemispheric or flat; bracts more or less imbricate, often foliaceous; receptacles chaffy. Ray-flowers neutral, showy; ligules yellow. Disk-flowers hermaphrodite and fertile; tube of the corollas half as long as the throat; lobes short, ovate, puberulent. Appendages of the style-branches obtuse, short, spatulate or oblong. Achenes flat, euneate-obovate, emarginate or obcordate. Pappus of several squamellae between the awns or paleaceous teeth.

Paleae of the receptacle soft and scarious

Disk 2-3 cm. in diameter; leaves ovate to lanceolate, thin, not strongly reticulate.

1. *H. quinquenervis*.

Disk less than 2 cm. wide; leaves oblanceolate to linear, strongly reticulate.

Disk about 1.5 cm. wide, yellow; bracts linear-lanceolate, subequal, in about 2 series

2. *H. Parryi*

Disk about 1 cm. broad, purple; bracts unequal, in 3-4 series.

Ligules 5-6 mm. long

3. *H. microcephala*

Ligules more than 1 cm. long

4. *H. scabra*.

Paleae of the receptacle firm-chartaceous.

Stem more or less hirsute, rarely glabrous; leaves thin, not strongly reticulate

5. *H. Douglasii*

Stem more or less scabrous-puberulent; leaves rather firm and reticulate

6. *H. uniflora*

1. *H. quinquenervis* (Hook.) A. Gray. Stem 5-15 dm. high, glabrous or sparingly hirsute; leaves mostly opposite; blades ovate-lanceolate or elliptic-lanceolate, acuminate, 1-2.5 dm. long, usually with two pairs of the lateral veins prominent, sparingly hirsute; heads long-peduncled, nodding; involucre about 2 cm. high and 4-5 cm. broad; bracts lanceolate, acuminate, hirsute-ciliate; ligules 15-20, pale yellow, 2.5-3 cm. long. Mountains, along streams: S.D.—N.M.—Utah—Ida.—Mont. Submont.—Mont. Jl—Au.

2. *H. Parryi* A. Gray. Stem slender, about 3 dm. high, hirsute; the lower leaves opposite, petioled, the upper subsessile, mostly alternate; blades oblanceolate or elliptic, 2-10 cm. long, rigid, triple-veined; heads rather short-peduncled; involucre 10-12 mm. high, 15-20 mm. broad; bracts linear-lanceolate, attenuate, hirsute-ciliate; ligules about 15 mm. long. Mountains: Colo.—N.M.—Ariz. Mont. Jl—Au.

3. *H. microcephala* A. Gray. Stem 2-4 dm. high, paniculately branched, scabrous-hispidulous; leaves ridged, all but the lower alternate; basal leaves petioled, spatulate, scabrous; stem-leaves linear or nearly so, sessile; involucre about 1 cm. high and broad; bracts lanceolate, obtuse, hirsute; ligules 5-6 mm. long. Dry plains and cañons: sw Colo.—Utah—N.M. Son.

4. *H. scabra* Payson. Stems several, 6-8 dm. high, cymosely branched; leaves dark green, coriaceous, linear-lanceolate to linear, the lower 1.5-2.5 dm. long, petioled; bracts lanceolate, acute; paleae truncate, ciliate at the apex; ligules 8-10, orange, more than 1 cm. long; pappus of two awns and several lacerate squamellae. Ravines: w Colo. Au.

5. *H. Douglasii* T. & G. Stem 4-10 dm. high, more or less hirsute or glabrous below; leaves mostly opposite, the lower oblanceolate, petioled, triple-veined, hirsute, 8-12 cm. long, the upper lanceolate, sessile; involucre about 15 mm. high and 3 cm. broad; bracts linear-lanceolate, attenuate, hirsute-ciliate; ligules 2.5-3 cm. long. Hillsides and pine-land: Mont.—w Wyo.—Ore.—B.C. Submont. Je—Jl.

6. *H. uniflora* (Nutt.) T. & G. Stem 3-6 dm. high, puberulent; leaves mostly opposite, petioled or the uppermost sessile, oblong-lanceolate, 5-12 cm. long, scabrous, obtuse; involucre 12-15 mm. high, 2.5-4 mm. broad; bracts lanceolate, acute, hirsute-ciliate on the margins; ligules 2-3 cm. long. *H. multicaulis* D. C. Eat. Hills and mountains: Mont.—N.M.—Nev.—Ida. Submont.—Mont.

77. XIMENËSIA Cav.

Annual caulescent herbs, ours canescent. Leaves alternate or sometimes opposite, toothed or lobed. Heads solitary or few, radiate, peduncled. Involucres rather flat; bracts narrow, spreading, foliaceous, nearly equal. Ray-flowers pistillate, fertile; ligules yellow. Disk-flowers numerous, hermaphrodite, fertile. Anthers somewhat sagittate at the base. Style-branches with slender pubescent appendages. Achenes flat, winged. Pappus of short awns, without intermediate scales.

1. *X. exauriculata* (Robins. & Greenm.) Rydb. Annual, with a taproot; stem 3-6 dm. high, white-tomentose; leaf-blades ovate or rhombic-lanceolate, saliently dentate, minutely strigose but green above, densely white-strigose

beneath, 3-7 cm. long; heads few, paniculate; involucre scarcely 1 cm. high, 1.5 cm. broad; ligules orange, 12-15 mm. long. *Verbesina encelioides exauriculata* Robins. & Greenm. Mountain valleys: Mont.—Tex.—Ariz. Son.—Mont. Je-O.

78. COREÓPSIS L. TICKSEED.

Annual or perennial herbs. Leaves various. Heads on long peduncles, radiate. Involucres campanulate, their bracts in two series, all more or less united at the base, the outer ones usually narrow and foliaceous, the inner broad, variously colored, in ours orange or brown, scarious or with scarious margins. Ray-flowers neutral; ligules yellow. Disk-flowers fertile. Receptacle flat or slightly convex. Achenes flat or more or less convex on the back. Pappus of two fimbriate squamellae, two awns or minute teeth, or none.

Leaves pinnatifid.

Achenes winged.

Achenes wingless.

Leaves simple.

1. *C. Atkinsoniana*.

2. *C. tinctoria*.

3. *C. lanceolata*.

1. ***C. Atkinsoniana*** Dougl. Annual or perennial (?), with a taproot; stem 4-10 dm. high, glabrous; leaves opposite, pinnately or bipinnately divided into linear divisions, glabrous; involucre about 6 mm. high, 15 mm. broad; outer bracts oblong, obtuse, the inner broadly ovate; ligules orange, 12-15 mm. long. River banks: B.C.—N.D.—Ore. *Plann.* Jl-Au.

2. ***C. tinctoria*** Nutt. Annual, with a taproot; stem 4-10 dm. high, glabrous; lower leaves bipinnately, the upper ones pinnately divided into linear divisions, glabrous; involucre about 7 mm. high, 10-15 mm. wide; outer bracts oblong, in fruit reflexed; inner bracts ovate or lance-ovate, acute; ligules 8-12 mm. long, orange, with or without purple base. Low ground: Man.—Va.—Tex.—Ariz.—e B.C. *Plann.* Je-Au.

3. ***C. lanceolata*** L. Perennial, with a short rootstock; stem 2-5 dm. high, glabrous; leaves opposite, the lower spatulate or oblanceolate, petioled, the upper linear-lanceolate or linear, obtuse; involucre 8 mm. high and 12-15 mm. broad; outer bracts lanceolate, only slightly shorter than the ovate-lanceolate inner ones; ligules orange, 12-25 mm. long, coarsely toothed; achenes broadly wing-margined; pappus obsolete. Rich soil: Ont.—Fla.—La.—N.M.—Colo. *Plann.* My-Au.

79. BĪDENS L. BEGGAR-TICKS, BUR-MARIGOLD.

Caulescent herbs, ours all annual. Leaves mostly opposite, simple or pinnatifid. Heads numerous, radiate or discoid. Involucres campanulate or turbinate, of two series of bracts, distinct or united only at the very base, the outer foliaceous, the inner scarious and appressed. Receptacle flat, chaffy. Ray-flowers neutral; ligules yellow or white, or none. Disk-flowers hermaphrodite and fertile. Achenes flat, 4-angled, or rarely almost terete, beakless. Pappus of 2-4 (in ours retrorsely) barbed awns or teeth, rarely none.

Achenes flat, obovate or cuneate, leaves or segments broad

Leaves pinnately 3-5-foliate

Outer bracts 4-8, achenes nearly black.

Outer bracts 10-16; achenes brown.

Leaves simple.

Heads discoid, erect; corolla 4-toothed; achenes not tubercled

Heads usually radiate, nodding; corolla 5-toothed.

Outer bracts not much longer than the inner, achenes not corky on the angles.

Outer bracts surpassing the rays, achenes with corky angles.

1. *B. frondosa*.

2. *B. vulgaris*.

3. *B. comosa*.

4. *B. prionophylla*.

5. *B. glaucescens*.

6. *B. Bigelovii*.

7. *B. tenuisecta*.

Achenes linear, tetragonal, leaf-segments small.

Divisions of the leaves oblong or lanceolate.

Divisions of the leaves linear.

1. ***B. frondosa*** L. Annual; stem 3-10 dm. high; leaves pinnately 3-5-foliate, glabrous or nearly so, scabrous on the margins; leaflets 3-8 cm. long, lanceolate or oblong-lanceolate, sharply serrate, acuminate; involucre 10-15 mm. high and broad; outer bracts 4-8, spatulate-linear, entire, ciliate; ligules usually

present, golden-yellow, equalling the disk; achenes black, tuberculate. Wet places: N.B.—Fla.—Utah—B.C. *Plain.* Jl-O.

2. *B. vulgata* Greene. Annual; stem 5-10 dm. high, glabrous; leaves pinnately 3-5-foliolate, glabrous or nearly so; leaflets lanceolate, acute, serrate, short-stalked; involucre 10-12 mm. high, 15-25 mm. broad; outer bracts 8-16, linear or linear-ob lanceolate, ciliate, entire, rarely exceeding the disk; ligules usually present, equalling the disk; achenes brown or olivaceous, smooth or merely papillose. Wet ground: Ont.—N.C.—Calif.—B.C. *Plain.* Au-S.

3. *B. comosa* (A. Gray) Wiegand. Annual; stem 3-8 m. high, glabrous; leaves simple, 5-10 cm. long, narrowly elliptic or lance-elliptic, acuminate, serrate; involucre about 12 mm. high and 12-18 mm. broad; outer bracts 6-8, linear or linear-lanceolate, mucronate, entire, 2-5 times as long as the disk, nearly erect; achenes olive-green or brownish, smooth; awns 3. Wet ground: Mass.—Va.—Colo.—Neb. *Plain.* Au-O.

4. *B. prionophylla* Greene. Annual; stem slender, 3-5 dm. high, more or less pubescent; leaves linear or linear-lanceolate, sharply serrate, 5-10 cm. long, sessile; heads nodding, about 1 cm. high, and 2 cm. broad; achenes greenish; awns 3 or 4, very unequal. Water and wet places: Ont.—N.Y.—S.D.—(? Colo.)—Mont. *Plain.* Au-S.

5. *B. glaucescens* Greene. Annual; stem 3-7 dm. high, glabrous or sparingly hairy; leaves linear-lanceolate, 5-15 cm. long, serrate, sessile, somewhat paler beneath; heads nodding, 1 cm. high, 2-3 cm. wide; ligules often 1 cm. long; awns 4. *B. cernua* of western reports. In water and wet grounds: Sask.—Kans.—Utah—Ida.—Alta. *Plain—Submont.* Jl-S.

6. *B. Bigelovii* A. Gray. Annual; stem 4-6 dm. high, glabrous or sparingly pubescent; leaves bipinnate, 4-10 cm. long; blades deltoid in outline, primary divisions broadly ovate, the secondary ones oblong or oblong-ovate, obtuse or acutish; involucre about 6 mm. high and 1 cm. broad; outer bracts linear, obtuse, shorter than the inner; outer achenes 5-6 mm. long, terete, striate, their awns less than 2 mm. long; central achenes 10-15 mm. long, their awns over 3 mm. long. Along streams. Tex.—Colo.—Ariz. *Son.—Submont.* Jl-S.

7. *B. tenuisecta* A. Gray. Annual; stem 3-6 dm. high, branched from the base, glabrous; leaves twice or thrice ternately or pinnately dissected into linear lobes; heads about 1 cm. high and broad; bracts linear, hirsute, the outer usually slightly longer than the inner; achenes glabrous, the outer 6-8 mm. long, the inner 10-12 mm. long; awns fully 3 mm. long, those of the outer achenes shorter. Along streams: Tex.—Colo.—Ida.—Ariz.; Mex. *Son.—Submont.* Au-S.

80. THELESPERMA Less.

Glabrous perennial, or annual, with finely dissected or rarely linear entire leaves and long-peduncled heads. Involucre hemispheric or campanulate, of two distinct series of bracts, the outer narrow, short, often spreading, the inner broad, united to about the middle into a cup, their free lobes scarious-margined. Receptacle flat, with a broad, 2-nerved, white-scarious palca subtending each disk-flower. Ray-flowers present, neutral, or none; ligules, if present, yellow, mostly toothed. Disk-flowers perfect, fertile; corolla-tube slender; limb 5-toothed. Anthers obtuse and entire at the base. Style-tips acute. Achenes oblong or linear, terete or slightly compressed. Pappus of 2 retrorsely hispid awns, or sometimes none.

Heads radlate.

Leaf-segments linear-filiform, 1 mm. or less wide

Annual or biennial; outer bracts subulate-linear, more than half as long as the inner. 1. *T. trifidum.*

Perennial from a rootstock; outer bracts linear-lanceolate, half as long as the inner or less. 2. *T. tenue.*

Leaf-segments linear, over 1 mm. wide; plant perennial or the first only biennial.

Plant with a taproot, leafy throughout 3. *T. intermedium.*

Plant with a creeping rootstock or woody caudex, leafy only near the base

Involucre not cleft below the middle, throat of the disk-flowers campanulate, shorter than the lobes. 4. *T. ambiguum.*

Involucre cleft below the middle; throat of the disk-flowers cylindraceous, longer than the lobes. 5. *T. subnudum*
Heads discoid; perennials, with a rootstock or woody caudex.

Plant less than 2 dm. high; involucre with very broad scarious margins.

Plants 3-6 dm. high; involucre with very narrow scarious margins. 6. *T. marginatum*. 7. *T. gracile*.

1. *T. trifidum* (Poir.) Britton. A slender annual or biennial; stem branched 3-9 dm. high, leafy; leaves bipinnately divided; inner bracts united not higher than the middle, with broad scarious margins; ligules 12-15 mm. long; awns of the pappus rather short, not longer than the width of the achenes. In dry soil: Neb.—Tex.—N.M.—e Colo. *Plain—Submont.* Je—Au.

2. *T. tenue* Rydb. Stem 1-3, slender, less than 2 mm. in diameter, mostly simple, 1.5-4 dm. high; leaves twice pinnately dissected; inner bracts united to the middle, broadly scarious-margined; ligules 8-12 mm. long; awns of the pappus very short, about half as long as the width of the achenes. Plains and mountain valleys: Colo. *Submont.—Mont.*

3. *T. intermedium* Rydb. A glabrous bushy biennial or perhaps perennial; stems several, 2-6 dm. high; leaves once or twice pinnately divided; involucre about 1 cm. broad; outer bracts very narrowly linear-lanceolate, about half as long as the inner, these united to about the middle, scarious-margined; ligules 10-12 mm. long; teeth of the pappus longer than the width of the achenes. On plains in dry or sandy soil: Neb.—Wyo.—Colo. *Plain—Submont.* Je—Au.

4. *T. ambiguum* A. Gray. Stem 2-4 dm. high; leaves once or twice pinnately divided; upper stem-leaves much reduced, often simple; outer bracts very short, ovate or elliptic, 1-2 mm. long, obtuse, the inner very broadly scarious-margined. In dry soil: N.M.—Colo. *Son.* Je—Jl.

5. *T. subnudum* A. Gray. Stem subscapose, 1-3 dm. high; leaves pinnately or bipinnately divided into linear or linear-lanceolate divisions; outer bracts short, oblong, about one-fourth as long as the inner, these broadly scarious-margined; pappus a minute 4-5-toothed crown or obsolete. In dry soil: N.M.—Colo.—Utah—Ariz. *Son—Submont.* My—Je.

6. *T. marginatum* Rydb. Stem 1-2 dm. high, leafy mostly at and near the base; leaves pinnately or bipinnately divided into linear divisions, 1-2 mm. wide; peduncles mostly solitary, 7-10 cm. long; heads about 1 cm. broad; outer bracts oblong, about one-third as long as the inner, these united to the middle; teeth of the pappus minute. On dry plains: Sask.—Mont. *Plain.* My—S.

7. *T. gracile* (Torr.) A. Gray. Stem 3-9 dm. high, branched and leafy; leaves as in the preceding, the upper reduced and often simple; heads 12-15 mm. broad; outer bracts oblong, obtuse, one-fourth as long as the inner, the latter united to the middle or beyond; awns of the pappus longer than the width of the achenes. On plains and prairies: Neb.—Tex.—Ariz.—Wyo. *Plain—Mont.* My—Au.

81. PTILONELLA Nutt.

Loosely branched annuals. Leaves alternate, narrowly linear, entire. Heads radiate. Bracts of the involucre narrow, subequal, in two series. Receptacle convex; paleae thin or scarious, narrow. Ray-flowers 3-6, pistillate and fertile; ligules white, 3-cleft. Disk-flowers 7-12, hemaphrodite, fertile, or the central one sterile; corollas white, 5-cleft. Style of the fertile disk-flowers with two short branches, that of the infertile central one entire. Pappus of many narrow, linear or aristiform, fimbriate-lacerate squamellae, sometimes wanting. [*Blepharipappus* Hook., in part.]

1. *P. scabra* (Hook.) Nutt. Annual; stem 1-3 dm. high, branched, puberulent, sometimes also sparingly hispid, more or less glandular above; leaves alternate, narrowly linear, entire, scabrous; heads short-peduncled; involucre 6-7 mm. high, 7-10 mm. broad; bracts oblong, glandular-puberulent; ligules white, 6-7 mm. long; disk white. *Blepharipappus scaber* Hook. Dry plains and mountains: Wash.—Ida.—Nev.—Calif. *Son.—Submont.* Ap—Jl.

82. MÀDIA Molina.

Glandular-viscid, heavy-scented annuals. Leaves alternate, entire, narrow. Heads radiate. Involucre campanulate; bracts in a single series, strongly inflexed on the margins enclosing the ray-achenes; paleae in a single series enclosing the disk-flowers as an inner involucre inside the rays. Ray-flowers pistillate, fertile; ligules inconspicuous, cuneate, 3-lobed. Disk-flowers hermaphrodite and fertile. Achenes angled, those of the ray-flowers laterally flattened, very oblique. Pappus wanting.

Ray-flowers 5-12, heads not glomerate

Heads on short branches, racemously disposed

Heads on long branches, more corymbose

Ray-flowers 2-5, or none, heads glomerate

1 *M. racemosa*.

2 *M. dissitiflora*.

3. *M. glomerata*

1. *M. racemosa* T. & G. Stem 3-6 dm. high, pilose, glandular above; leaves linear, 8-15 cm. long, pilose on both sides; branches of the inflorescence short; involucre 8-10 cm. high and broad; ligules 5-8; disk-achenes flat, indistinctly nerved. *M. sativa racemosa* A. Gray. Rocky or sandy places: B.C.—Ida.—Utah—Calif. Son. My-Jl.

2. *M. dissitiflora* (Nutt.) T. & G. Stem slender, pilose, 3-6 dm. high; leaves linear or lance-linear, finely pilose, entire; heads scattered, solitary at the ends of rather slender branches; involucre about 6 mm. high and broad, glandular; ligules 5-8; achenes all flat, not at all angled. Hillsides and valleys: B.C.—Mont.—Utah—Calif. Submont. Je—Au.

3. *M. glomerata* Hook. Stem 3-5 dm. high, leafy, hirsute, glandular in the inflorescence; leaves linear, pilose and hirsute-ciliate; heads more or less glomerate; involucre about 6 mm. high and 4 mm. wide; rays 2-5, sometimes none; achenes of the rays somewhat curved, 1-nerved on each face, those of the disk 4- or 5-angled. Open places in the mountains: Sask.—Colo.—Calif.—B.C. Son.—Mont. Jl—S.

83. HARPAECÁRPUS Nutt.

Slender annuals, with narrowly linear leaves. Heads ligulate. Involucre campanulate; bracts 4-8, in a single series, boat-shaped, each enclosing a ray-achene; paleae of the receptacle united into a 3-5-toothed cup, surrounding the single disk-flower. Ray-flowers 4-8, fertile; ligules inconspicuous, cuneate. Disk-flower single, hermaphrodite and fertile. Ray-achenes compressed laterally, lunate, but broader above; disk-achene obliquely obovate. Pappus wanting.

1. *H. exiguus* (Smith) A. Gray. Stem slender, 1-3 dm. high, hirsute as well as glandular-puberulent, paniculately branched; heads on filiform peduncles; involucre about 3 mm. high and broad; bracts 4-8, hirsute-glandular. *Madia filipes* A. Gray. Open ground: B.C.—Ida.—L. Calif. Son. My-Jl.

84. HEMIZONÈLLA A. Gray.

Hirsute pubescent and glandular annuals, with linear, mostly opposite leaves. Heads radiate, small. Bracts of the involucre 4 or 5, broad, infolded, enclosing each a ray-achene; paleae united into a 3-5-toothed cup, surrounding the disk-flowers. Ray-flowers 4 or 5, pistillate and usually fertile; ligules minute. Disk-flowers solitary or rarely 2-4, hermaphrodite and fertile. Achenes somewhat dorso-ventrally compressed, those of the disk-flowers straight, those of the ray-flowers incurved.

1. *H. minima* A. Gray. Annual; stem 3-10 cm. high, pilose; leaves 1 cm. long or less, linear, pilose; peduncles shorter than the heads; involucre about 3 mm. high and broad; ray-achenes obovate, slightly curved, strongly obcompressed. Dry sterile soil: B.C.—Ida.—Nev.—Calif. Son. Je-Jl.

85. LAGOPHYLLA Nutt.

Slender herbs, with alternate entire leaves and small heads in leafy-bracted clusters. Heads radiate. Bracts of the involucre about 5, thin, herbaceous, with the margins at the base, infolded and each enclosing an achene, with which

they fall; paleae in a single series surrounding the disk-flowers. Ray-flowers pistillate and sterile; ligules cuneate, 3-cleft. Disk-flowers about 5, hermaphrodite and fertile. Ray-achenes obovate-oblong or clavate, obcompressed.

1. *L. ramosissima* Nutt. Stem 2-8 dm. high, at least diffusely branched, glabrate or slightly pilose when young; lower leaves spatulate, the upper linear or nearly so, softly silky-canescens; head about 6 mm. high; bracts silky-ciliate; ligules short, purplish, clavate, carinate along the upper side, about 3 mm. long. Dry ground: Wash.—Ida.—Nev.—Calif. Son. Je-S.

86. BLEPHARIPAPPUS Hook.

Annuals, with mostly alternate leaves. Heads radiate. Bracts of the involucre broad, flattened on the back below, with thin, infolded margins, enclosing the ray-achenes; paleae in a series between the disk- and ray-flowers and occasionally some among the latter. Ray-flowers 8-20, pistillate and fertile; ligules conspicuous, various-colored. Disk-flowers hermaphrodite and mostly sterile; corollas yellow; lobes pubescent. Achenes of the ray-flowers obcompressed, without pappus. Pappus of the disk-flowers of 5-20 bristles or awns.

1. *B. glandulosus* Hook. Annual; stem 1-4 dm. high, diffusely branched, more or less hirsute, glandular at the summit; leaves lanceolate or linear, hirsute, the lower lacinate-pinnatifid or lobed, the upper entire; involucre 7-8 mm. high, 12-15 mm. broad; bracts lance-linear, acute, hispidulous and with some black glands below; ligules 8-13, white, about 1 cm. long, 3-lobed; pappus white. *Layia glandulosa* Hook. & Arn. Sandy places: B.C.—Ida.—w N.M.—s Calif. Son. Mr-Je.

87. PSILÓSTROPHE DC. PAPER FLOWER.

Tomentose or woolly perennial (all ours) or rarely biennial herbs, or low shrubs. Leaves alternate, entire or lobed. Involucre cylindric or campanulate; bracts in a single series, equal, connivent, sometimes with 1-4 scarious ones within; receptacle naked. Ray-flowers few, pistillate and fertile; ligules broad, 3-lobed, yellow, becoming papery, persistent. Disk-flowers hermaphrodite and fertile; corollas yellow. Style-branches truncate at the apex. Achenes linear, striate. Pappus of lacerate or ciliate squamellae. [*Riddellia* Nutt.]

Stem merely sparingly villous or floccose, not densely white-pannose.

Squamellae of the pappus one-third as long as the disk-corollas, ovate, mostly obtuse, leaves broadly spatulate, ligules 8-12 mm. long, indistinctly nerved

1. *P. Bakeri*

Squamellae of the pappus one-half as long as the disk-corollas, lanceolate, acute or acuminate, ligules 5-8 mm. long, distinctly veined

2. *P. Tagetinae*

Leaves oblanceolate, loosely villous, heads short-peduncled

3. *P. sparsiflora*

Upper leaves linear or linear-oblanceolate, glabrate, heads slender-peduncled

4. *P. Cooperi*

Stem densely white-pannose.

1. *P. Bakeri* Greene. Stem much branched, 1-2 dm. high, loosely floccose; basal leaves 5-10 cm. long, petioled; blades spatulate, more or less distinctly 3-5-ribbed; involucre 7-10 cm. high and nearly as broad; ligules 5, 10-15 mm. long; achenes glabrous, striate. *P. pumila* (M. E. Jones) A. Nels. Dry plains and hills: Colo.—Utah. Submont. My-Je.

2. *P. Tagetinae* (Nutt.) Greene. Stem 1-3 dm. high, diffusely branched, loosely villous; lower leaves spatulate, 2-5 cm. long, entire or lobed; upper leaves narrowly oblanceolate; heads numerous, paniculate; involucre 6-8 mm. high and a little less broad; ligules 3-5, 5-8 mm. long. *Riddellia tagetina* T. & G. Dry plains: Tex.—Colo.—Ariz.; n Mex. Son. Je-S.

3. *P. sparsiflora* (A. Gray) A. Nels. Stem 1-3 dm. high, green, but sparingly hirsute; leaves linear, 5-8 cm. long, usually entire, hirsute; heads corymbose-paniculate; involucre about 6 mm. long, 4-5 mm. wide; ligules usually 3, 7-8 mm. long and still broader. *R. tagetina sparsiflora* A. Gray. Arid places: Ariz.—Utah. Son.

4. *P. Cooperi* (A. Gray) Greene. Undershrub, 2-5 dm. high; branches densely and finely white-pannose; leaves linear, 2-7 cm. long, tomentose; heads

paniculate; involucre 7-9 mm. high, 5-6 mm. broad; ligules mostly 5, 8-15 mm. long; pappus-squamellae oblong or lanceolate, erose at the summit, less than half as long as the disk-corollas. Gravelly plains: Ariz.—s Utah—s Calif.; L. Calif. *L. Son.* Ap—My.

88. *BAILEYA* Harv. & Gray. WILD MARIGOLD.

Annual or perennial floccose herbs. Leaves alternate, pinnatifid or the upper entire. Heads radiate. Involucre hemispheric; bracts equal, woolly, in two series; receptacle flat, naked, alveolate. Ray-flowers pistillate and fertile; ligules oval or oblong, yellow, 7-nerved, becoming papery, persistent. Disk-flowers hermaphrodite and fertile; corollas yellow. Anthers minutely sagittate at the base. Style-branches short, truncate. Achenes linear, truncate, many-ribbed. Pappus none.

Plant leafy throughout; annual.

Plant naked above, almost scapose, biennial.

1 *B. pleniradiata*
2 *B. multiradiata*.

1. *B. pleniradiata* Harv. & Gray. Stem 2-4 dm. high, floccose, leafy and branched; lower leaves incise-pinnatifid, with oblong or linear divisions, loosely floccose, the upper merely toothed or entire; heads solitary at the ends of the branches; peduncles 5-10 cm. long; involucre about 6 mm. high and 12 mm. broad; ligules 25-40, about 1 cm. long, 5 mm. wide. *B. multiradiata* A. Gray, not Harv. & Gray. Plains: Ariz.—Utah—s Calif; n Mex. *Son.* Ap—N.

2. *B. multiradiata* Harv. & Gray. Stem decumbent at the base, and leafy only below, very floccose; leaves pinnately or ternately pinnatifid; divisions again cleft with obovate or elliptic divisions; peduncles 1-2 dm. long; involucre about 8 mm. high, 15-20 mm. broad; ligules about 50, 12-15 mm. long, golden-yellow. *B. multiradiata nudicaulis* A. Gray. Dry plains: w Tex.—s Utah—Nev.—Ariz; n Mex. *Son.* Ap—O.

89. *MONÓTHRIX* Torr.

Low scabrous undershrubs. Leaves mostly alternate, small, punctate, mostly ovate. Heads radiate or discoid. Involucre hemispheric; bracts in two equal series, boat-shaped, double-ribbed, partly enclosing the marginal achenes; receptacle flat, alveolate. Ray-flowers, if present, pistillate and fertile. Disk-flowers many, hermaphrodite and fertile. Achenes flat, with a thick margin. Pappus of 1 barbellate awn or wanting.

1. *M. Stansburii* (A. Gray) Rydb. Stems 1-2 dm. high, diffusely branched; lower leaves opposite, the upper alternate, petioled; blades ovate or rhombic-ovate, dentate, 1 cm. long or less, scabrous, triple-veined; involucre 5-6 mm. high and fully as broad; bracts linear, acute; ligules 6-10, oblong, 3-4 mm. long, pappus-bristle present, shorter than the disk-corollas. *Laphamia Stansburii* A. Gray. Among rocks: Utah. *Son.* Je—Jl.

90. *PERICÔME* A. Gray.

Tall, strong-scented perennial herbs. Leaves opposite, petioled; blades hastate or triangular. Heads discoid in large cymes. Involucre turbinate-campanulate; bracts in a single series, more or less united below, hyaline-margined, with thick midrib. Flowers hermaphrodite and fertile; corollas pale yellow, 4-toothed. Anthers subsagittate at the base. Style-branches filiform, obtuse. Achenes linear-oblong, compressed, hispid-ciliate on the margins. Pappus a crown of fimbriate-lacerate squamellae, sometimes with two marginal awns.

1. *P. caudata* A. Gray. Widely branching perennial, 1 m. high or more; leaf-blades thin, green, minutely resinous-granuliferous, triangular-hastate, 5-15 cm. long, sparingly sinuate-dentate, caudately long-acuminate; involucre about 5 mm. high and 6 mm. wide. Rocky cañons: N.M.—Colo.—Calif.; n Mex. *Submont.* Jl—O.

91. *PICRADENIÓPSIS* Rydb.

Low perennial canescent herbs, more or less woody at the base. Leaves opposite, pedately 3-5-divided, with linear divisions, or the upper entire. Heads radiate, corymbose. Involucre campanulate; bracts subequal, in two series,

3-nerved, the outer more or less keeled. Ray-flowers few, pistillate and fertile; ligules yellow, short. Disk-flowers many, hermaphrodite and fertile; corollas yellow. Achenes elongate-obpyramidal, glandular or hispidulous. Pappus of a crown of 8 ovate or lanceolate squamellae.

1. *P. oppositifolia* (Nutt.) Rydb. Stem 1-2 dm. high, branched below, strigose-puberulent; leaves 1-5 cm. long, impressed-punctate and strigose-puberulent; involucre 5-7 mm. high and 7-10 mm. broad; ligules 3-4 mm. long; achenes glandular. *Bahia oppositifolia* A. Gray. Alkaline soil and dry plains: N.D.—Tex.—Ariz.—Mont. *Plain—Submont.* Je-S.

92. AMAURIOPSIS Rydb.

Glandular-pubescent annuals. Leaves alternate, twice or thrice ternately divided. Heads radiate, in leafy corymbs. Involucre hemispheric; bracts 16-20, herbaceous, in 3 series; receptacle flat, alveolate. Ray-flowers 16-20, pistillate, fertile; ligules cuneate, 3-cleft. Disk-flowers hermaphrodite and fertile; corollas yellow. Achenes elongate, narrowly obpyramidal, 4-angled, striate. Pappus wanting.

1. *A. dissecta* (A. Gray) Rydb. Stem 3-10 dm. high, puberulent or glabrate below, glandular above; leaves with oblong or linear obtuse divisions, more or less puberulent; involucre 6-7 mm. high, about 1 cm. broad, glandular-puberulent; bracts oblong-ob lanceolate to obovate-oblong, abruptly acuminate. *Bahia chrysanthemoides* A. Gray. *Villanova dissecta* Rydb. Along streams: N.M.—Wyo.—Ariz.; n Mex. *Son.—Mont.* Jl-S.

93. PLATYSCHKURIA (A. Gray) Rydb.

Perennial grayish puberulent herbs, woody at the base. Leaves alternate, petioled, entire. Heads radiate, corymbose. Involucre hemispheric; bracts herbaceous in 2 series, oblong; receptacle flat, glabrous. Ray-flowers pistillate and fertile; ligules yellow, oblong, slightly 3-toothed. Disk-flowers fertile; corollas glandular, yellow. Achenes elongate, 4-angled, tapering downward, sparingly hairy on the angles. Pappus of 10-16 lanceolate squamellae, with the distinct midrib extending beyond the apex.

Stem scapiform or nearly so, leaves firm, oval to lanceolate.
Stem leafy; leaves thin, oblong.

1. *P. integrifolia*
2. *P. oblongifolia*.

1. *P. integrifolia* (A. Gray) Rydb. Stem 1.5-4 dm. high, almost scapiform; basal leaf-blades cinereous-puberulent, oval to lanceolate, 2-7 cm. long, 3-ribbed, thick; upper stem-leaves much reduced, linear-lanceolate; involucre 8-10 mm. high, 12-20 mm. broad; ligules 8-10 mm. long; pappus-squamellae lanceolate, erose, 2 mm. long. *Bahia integrifolia* A. Gray. *B. nudicaulis* A. Gray. *B. desertorum* M. E. Jones. Dry plains: Wyo.—Colo.—Utah. *Son.—Submont.* My-Je.

2. *P. oblongifolia* (A. Gray) Rydb. Stem leafy, 2-3 dm. high, strigose-puberulent; leaf-blades oblong or lanceolate, obtuse, 2-5 cm. long, 3-ribbed; involucre about 8 mm. high and 12 mm. wide; pappus-squamellae linear-lanceolate, entire, fully 4 mm. long. *Bahia oblongifolia* A. Gray. Arid regions: N.M.—sw Colo.—se Utah—Ariz. *Son.* Jl-S.

94. HULSEA T. & G.

More or less fleshy villous or viscid perennials, biennials, or annuals. Leaves alternate, sessile or with winged petioles. Heads radiate, large. Involucre hemispheric; bracts in 2 or 3 series, narrow; receptacle flat, alveolate-dentate with minute horny teeth. Ray-flowers pistillate and fertile; ligules elongate, yellow or purplish. Disk-flowers fertile; corollas yellow, glandular-viscid. Style-branches obtuse. Achenes linear-cuneate, compressed, villous especially on the margins. Pappus of 4 hyaline nerveless squamellae.

1. *H. carnosa* Rydb. Perennial, with a thick root and creeping subterranean stems, caespitose; overground stems 1.5-3 dm. high, very leafy throughout, pubescent, more or less viscid; leaves very fleshy, linear, sinuately lobed, viscid-pubes-

cent, 5-8 cm. long; head solitary, 1.5-2 cm. high; bracts linear-lanceolate, viscid-pubescent and more or less villous; rays light yellow, less than 1 cm. long. Among rocks: Mont.—Wyo.—Ida. *Subalp.*—*Alp.* Jl—Au.

95. CEPHALOBÉMBIX Rydb.

Slender glandular-hirsute annuals. Leaves impressed-punctate, pinnately dissected into linear-filiform divisions, the lower opposite, the upper alternate. Heads discoid, corymbose. Involucre turbinate or obconic; bracts 5-8, obovate, scarious and more or less colored around the margins. Flowers hermaphrodite and fertile; corollas light yellow, glandular on the tube. Style-branches with short acute appendages. Achenes elongate-obpyramidal, 4-angled, hispidulous on the angles below. Pappus of 8 scarious squamellae.

1. *C. neomexicana* (A. Gray) Rydb. Stem branched, 1-2 dm. high, sparingly strigose or glabrate; leaves pinnately divided into 3-5 linear divisions, which are entire or the lowest 2-3-cleft; involucre about 6 mm. high and 8 mm. broad; bracts about 10, striate. *Bahia neomexicana* A. Gray. Sandy soil: N.M.—Colo.—Ariz.; Mex. *Son.*—*Submont.* Au—O.

96. HYMENOPÁPPUS L'Her.

More or less tomentose-floccose perennials or biennials, with mostly 1-2-pinnately divided leaves. Heads corymbose or rarely solitary, discoid. Involucre hemispheric, or nearly so; bracts 6-12, in 1-2 series, subequal, appressed, more or less colored and scarious-margined. Receptacle naked. Disk-flowers all perfect and fertile; corollas yellow. Styles with short conic appendages. Achenes mostly obpyramidal, 4-5-angled, the faces 1-3-nerved. Pappus of 10-20 hyaline obtuse scales without costa, or none.

Throat of the corolla campanulate, 1-2 mm. long, not over twice as long as the lobes

Pappus over 1 mm. long, equalling the corolla-tube or nearly so.

Stem 3-6 dm. high, leafy throughout, heads numerous.

Plant sparingly and loosely floccose, leaves glabrate in age 1. *H. tenuifolius*

Plant densely tomentose, leaves permanently tomentose 2. *H. tomentosus*.

Stem less than 3 dm. high.

Stem-leaves much reduced; stem white-tomentose or nearly so, heads few.

Stem-leaves not much reduced, stem sparingly grayish-tomentose.

5. *H. cinereus*

Pappus 1 mm. or less long, much shorter than the corolla-tube, stem-leaves and heads few.

Pappus not hidden by the hairs of the achenes

Stem permanently densely white-tomentose, achenes silky 4. *H. arenosus*

Stem sparingly grayish-tomentose, glabrate in age, achenes loosely villous

5. *H. cinereus*.

Pappus hidden by the hairs of the achenes, or sometimes none

Leaflets glabrate in age, at least above, ultimate segment 5-30 mm. long

6. *H. filifolius*

Leaves permanently densely white-tomentose, ultimate segments short, 1-5

mm. long. 7. *H. luteus*.

Throat of the corolla cylindro-campanulate, 1.5-4 mm. long, 3-4 times as long as the lobes.

Pappus equalling the corolla-tube, plant dwarf.

Heads less than 1 cm. high and broad, corolla-tube 1.5-2 mm. long, stem not

woolly at the base 8. *H. parvulus*

Heads over 1 cm. high and 1.5 cm. broad, corolla-tube 3-4 mm. long, stem woolly

at the base

Bracts more or less rose- or purple-tinged. 9. *H. lugens*.

Bracts yellow-tinged 3. *H. scaposus*.

Pappus shorter than the corolla-tube, throat 3-4 mm. long; plant 2-4 dm. high

Stem leafy at least half its height, decidedly woolly at the base. 10. *H. eriopodus*

Stem leafy only at the base, not conspicuously woolly. 11. *H. macroplottus*

1. *H. tenuifolius* Pursh. Biennial or short-lived perennial, slightly tomentose, in age often glabrate, 3-6 dm. high, branched and leafy; leaves except the uppermost 1-3 pinnately divided into linear divisions, 5-30 mm. long; heads numerous, 8-12 mm. broad; corollas dirty white or cream-colored; achenes densely pubescent. Plains and dry prairies: N.D.—Wyo.—N.M.—Tex.—Ark. *Plain.* Je—S.

2. *H. tomentosus* Rydb. Biennial; stem 3-4 dm. high, leafy and branched above; leaves 5-7 cm. long, bipinnately divided into linear segments, 4-10 mm. long; involucre densely woolly, somewhat turbinate, 8 mm. high and broad; flowers yellow; corolla throat a little over 1 mm. long, broadly campanulate, of about the same length as the lobes. Dry plains: s Utah. *Son.*

3. *H. scaposus* Rydb. Perennial; stem almost naked, with 1-2 reduced leaves, more or less densely tomentose; leaves mostly basal, 5-7 cm. long, bipinnately divided into linear segments, 3-10 mm. long, densely tomentose, especially at the base; heads about 1 cm. high and broad; bracts obovate, with yellowish or purplish scarious margins; corollas yellow; throat nearly 2 mm. long, campanulate and longer than the lobes; squamellae of the pappus fully 2 mm. long, longer than the tube of the corolla. Dry hills: N.M.—Utah—Nev.—Ariz. *Son.* My-Jl.

4. *H. arenosus* Heller. A white-tomentose perennial, with branched woody caudex; stems several, 2-4 dm. high, densely tomentose, especially at the base, 2-4-leaved, leaves mostly basal, twice pinnately divided into linear-filiform divisions 3-15 mm. long, 1 mm. wide; heads about 8 mm. high, 8-10 mm. broad; bracts oblong, with narrow scarious margins, tomentose; corollas yellow; throat nearly 2 mm. long; achenes long-silky; pappus rather short, about 1 mm. long, but not hidden by the hairs. On dry hills: N.M.—Colo.—Ariz. *Son.*—*Submont.* My-Jl.

5. *H. cinereus* Rydb. Perennial, with a caespitose caudex; stems about 2 dm. high, branched; leaves bipinnately divided into linear segments 1-2 cm. long and about 1 mm. wide, sparingly grayish tomentulose; heads 8-10 mm. high, 10-12 mm. broad; bracts oblong-obovate, with narrow scarious margins; corollas yellow; throat about 1.5 mm. long, broadly campanulate, longer than the lobes; achenes loosely villous. *H. ochroleucus* Greene. Dry hills and plains: Colo.—Utah. *Submont.*—*Subalp.* My-Jl.

6. *H. filifolius* Hook. Perennial; stem 2-3.5 dm. high, sparingly branched; leaves similar to those of *H. tenuifolius*; heads few, 10-15 mm. broad; bracts obovate-oblong, with broad scarious margins, tomentose; corollas bright yellow; throat about 1.5 mm. long; achenes densely villous, the long hairs hiding the small pappus; squamellae less than 1 mm. long. On plains and prairies: Alta.—Sask.—Kans.—N.M.—Nev.—Wash. *Plain*—*Submont.* Je-S.

7. *H. luteus* Nutt. Perennial; stem 1-2 dm. high, with a few reduced leaves and few heads; basal leaves 2-7 cm. long, twice pinnately divided into short lobes 1-5 mm. long; heads about 1 cm. high, 10-15 mm. broad; bracts oblong, broadly scarious-margined; corolla yellow; throat about 1 mm. long; achenes densely villous-hirsute; scales of the pappus short, about 0.5 mm. long. Bad-lands and clay-hills: Wyo. *Submont.*—*Mont.* My-Jl.

8. *H. parvulus* Greene. Perennial; stem 1-2 dm. high, scapiform, slightly tomentose; basal leaves 5-8 cm. long, bipinnatifid, with narrowly linear-filiform divisions, 5-12 mm. long, grayish-tomentose; stem-leaves few and small; involucre turbinate, 6-7 mm. high and broad; bracts oblong-obovate, greenish yellow, sparingly tomentulose; corollas brownish yellow; throat cylindro-campanulate, 1.5-2 mm. long, about 3 times as long as the teeth; achenes short villous. Dry hills: Colo. *Submont.* Jl-Au.

9. *H. lugens* Greene. Perennial; stem scapiform, 2-3 dm. high, white-tomentulose; leaves bipinnatifid with filiform divisions, permanently white-tomentose, 5-10 cm. long; stem-leaves small and few; involucre nearly 1 cm. high, 12-15 mm. broad; bracts elliptic, the outer usually with purple-tinged margins; corolla-throat cylindraceous, 3-4 mm. long, 3-4 times as long as the lobes; pappus-scales oblong-obovate, as long as the corolla-tube. Dry ridges: s Calif.—Utah—Ariz. *Son.*—*Submont.* My-Au.

10. *H. eriopodus* A. Nels. Perennial; stem 3-10 cm. high, leafy; leaves numerous, bipinnately divided into filiform divisions, sparingly tomentulose or glabrate; involucre about 1 cm. high and 12-15 mm. broad; bracts elliptic, scarious-margined, sometimes purplish; corolla-throat about 3 mm. long, cylindro-

campanulate, about 3 times as long as the lobes; pappus-scales linear-oblong, about half as long as the corolla-tube. Rocky places: Utah—Nev. *Son.* My.

11. *H. macroglottis* Rydb. Perennial; stems several, 3–4 dm. high; leaves mostly basal, about 1 dm. long, bipinnately divided into linear lobes 8–25 mm. long; stem-leaves simply pinnate or simple; heads few, 12 mm. high and 12–15 mm. broad; bracts oblong, with very narrow yellowish scarious margins; corolla yellow; throat deeply campanulate, 3–4 mm. long, 3–4 times as long as the lobes; squamellae of the pappus about 1 mm. long. Dry hills: Tex.—Colo.—Utah—Ariz. *Son.* Au–S.

97. *LEUCAMPYX* A. Gray. WILD COSMOS.

More or less floccose perennials. Leaves alternate, bi- or tripinnatifid into linear divisions. Heads corymbose, radiate. Involucres hemispheric; bracts subequal, in 2–3 series, with scarious colored tips and margins; receptacle convex, with broad membranous paleae, half enclosing the achenes. Ray-flowers pistillate and fertile; ligules broad, 3-toothed, white or cream-colored. Disk-flowers fertile; corollas yellow. Style branches penicillate, with short appendages. Achenes of the ray-flowers cuneate, 3-angled, those of the disk-flowers 5-angled, all more or less curved, striate and muriculate. Pappus a minute crown.

1. *L. Newberryi* A. Gray. Stem stout, 3–6 dm. high; involucres about 8 mm. high, 10–15 mm. wide; bracts obovate, obtuse; ligules 10–15 mm. long. Cañons: Colo.—N.M. *Submont.*—*Mont.* Je–Au.

98. *OTHAKE* Raf.

Erect glandular annual herbs. Leaves alternate, mostly entire. Heads corymbose or paniculate, radiate or discoid. Inflorescence campanulate to oboeic; bracts narrow, in 1–2 series, herbaceous, usually colored, at least at the tips. Receptacle small, flat, naked. Ray-flowers, when present, pistillate, fertile; ligules pink or rose-colored, broad, 3-cleft. Disk-flowers fertile; corollas pink or rose, 5-divided almost to the tube. Style-branches filiform, pubescent throughout. Achenes linear to narrowly obpyramidal, 4-angled. Pappus of 6–12 lanceolate, strongly ribbed squamellae.

Heads radiate, leaves lanceolate to linear-lanceolate.
Heads discoid; leaves narrowly linear

1 *O. sphacelata*
2 *O. macrolepis*.

1. *O. sphacelata* (Nutt.) Rydb. Stem stout, branched, hispid, glandular-pubescent and viscid above, 2–6 dm. high; leaves petioled, lanceolate or linear-lanceolate, scabrous on both sides, indistinctly 3-veined; involucre 10–15 mm. high; ligules 8–10, rose-purple, 1–2 cm. long; pappus-scales of the disk-flowers 6–8, lanceolate, more than half as long as the achenes. *Polypterus Hookeriana* A. Gray, in part, not *Palafoxia Hookeriana* T. & G. Sandy plains: Tex.—Neb.—Colo.—N.M.; n Mex. *Son.*—*Submont.*

2. *O. macrolepis* Rydb. Stem 3–4 dm. high, strigose-puberulent, and glandular on the upper parts; leaves strigose-puberulent on both sides, 3–5 cm. long, 2–3 mm. wide; involucres 9–10 mm. high and about as wide; bracts 8–12, linear-oblanccolate, abruptly acute; disk-corollas 14–15 mm. long; pappus-squamellae 6–8, lanceolate, caudate-acuminate 5–6 mm. long. Plains: Colo. Au.

99. *RIGIOPAPPUS* A. Gray.

Slender puberulent annuals. Leaves alternate, linear, entire. Heads radiate. Involucre turbinate; bracts subequal, in 2 series, linear-subulate, concave, partly enclosing the ray-flowers; receptacle flat, naked. Ray-flowers 5–8, pistillate, fertile; ligules short, scarcely exceeding the disk. Disk-flowers fertile. Style-branches short, glabrous, with subulate hirtellous tips. Achenes slender, linear, hispid. Pappus of 4 or 5 rigid subulate awn-like squamellae.

1. *R. leptocladius* A. Gray. Stem slender, 1–3 dm. high, minutely hirsutulous; branches naked below and becoming longer than the main stem; leaves

sessile, hirsutulous; heads solitary at the ends of the stem and branches; involucre 6 mm. high; flowers yellow, turning purplish or whitish. Dry ground: Calif.—Ida.—Wabs. *Son.* Mr.

100. **CHAMAECHAENACTIS** Rydb.

Cespitose scapiferous perennial, branching below the surface of the ground and with a woody root. Leaves all basal and simple, coriaceous, white-strigose below, sparingly hirsute and punctate above. Involucral bracts about twelve, in two series, the inner series longer and with scarious-margined, reddish tips. Corolla flesh-colored, with equal lobes. Stamens included. Style-tips broad. Achenes clavate, densely villous. Pappus of eight nearly equal squamellae, with prominent midrib and erose tips.

1. **C. scaposa** (Eastw.) Rydb. Leaves petioled; blades oblong or elliptic, to orbicular, 8–12 mm. long, coriaceous, entire or crenate, with revolute margins, strigose-canescens; scape 3–8 cm. long; involucre about 15 mm. high and broad; bracts oblong, obtuse, densely hirsute-villous. *Chaenactis scaposa* Eastw. *Actinella carnosa* A. Nels. Dry mesas and clayey soil: w Colo.—e Utah. My-Je.

101. **CHAENACTIS** DC. MORNING BRIDES.

Annual, biennial, or perennial herbs. Leaves alternate, usually pinnately dissected. Heads discoid, but the marginal flowers often with enlarged corollas. Involucre campanulate or turbinate; bracts herbaceous in 2 series; receptacle alveolate, naked or in some species bristly. Flowers hermaphrodite and fertile; corollas yellow, white, or flesh-colored, the throat cylindric or in some species funnelliform in the marginal flowers. Achenes linear, terete or oval in cross-section, or obscurely 4-angled, pubescent. Pappus of 4–16 hyaline squamellae.

Annuals

- Corollas yellow, pappus of minute callous squamellae 1. *C. Nevit.*
- Corollas white or flesh-colored, pappus of well developed squamellae
- Stamens partly exerted, bracts all appressed
- Involucral bracts acuminate, receptacle usually somewhat bristly. 2. *C. carphoclinia.*
- Involucral bracts obtuse or merely acute; receptacle naked
- Leaves bilpinnatifid 3. *C. stertoides.*
- Leaves simple, spatulate-linear. 4. *C. cusickii.*
- Stamens included, some of the outer bracts with spreading tips 5. *C. macrantha.*

Perennials

- Leafy-stemmed plants.
- Plant densely white-floccose
- Leaves mostly basal, broadly obovate in outline, with approximate divergent divisions; branches of the inflorescence usually divergent at the base and curved upwards 6. *C. brachyala.*
- Leaves scattered, ovate or lanceolate in outline; branches of the inflorescence ascending or erect, strict
- Plant 1–3 dm high, not fruticulose; leaves regularly pinnatifid 7. *C. achilleaeifolia.*
- Plant 3–4 dm high.
- Leaves narrow, mostly regularly pinnatifid; plant often fruticulose at the base 8. *C. imbricata*
- Leaves broader, interruptedly pinnatifid, with smaller segments interposed between the large ones; plant not fruticulose. 9. *C. cheilanthisoides.*
- Plant sparingly floccose, in age greener and glabrate
- Squamellae about half as long as the corolla; low perennials, 1–2 dm high, branched at the caudex 10. *C. humilis*
- Squamellae at least two-thirds as long as the corollas.
- Bracts shorter than the disk, stem 2–4 dm high; biennials with a taproot. 11. *C. Douglasii.*
- Bracts equalling the disk; stems 1–2 dm. high, from a caespitose rootstock. 12. *C. peduncularia.*
- Subcaespitose perennials, with rosulate leaves and nearly naked peduncles.
- Leaves oblanceolate, elliptic, or linear in outline; plants with a caespitose caudex.
- Inner bracts acuminate; leaf-blades narrowly lanceolate in outline. 13. *C. minuscula.*
- Inner bracts merely acute; leaf-blades oblanceolate or oblong in outline. 14. *C. alpina.*
- Leaf-blades obovate-cuneate or flabellate in outline; plant with a caespitose rootstock. 15. *C. Evermannii.*

1. *C. Nevii* A. Gray. Stem 1-2 dm. high, puberulent, branched; leaves pinnate or bipinnate, with linear or oblong lobes, slightly puberulent; involucre about 8 mm. high and 1 cm. broad; corollas yellow, the marginal ones not conspicuously enlarged; pappus of minute teeth or obsolete. Clayey soil: Ore.—Ida. Son. My-Je.

2. *C. carphoclinia* A. Gray. Stem diffusely branched, puberulent, not at all tomentose, 1-3 dm. high; leaves once or twice pinnatifid, with short filiform divisions, puberulent; heads numerous, 30-40-flowered; involucre about 8 mm. high and 10 mm. broad; bracts linear-subulate, puberulent; marginal corollas scarcely enlarged; pappus squamellae 4, ovate-lanceolate, acute or acuminate, those of the marginal flowers much shorter than those of the central ones. Arid regions: N.M.—s Utah—s Calif. Son.

3. *C. stevioides* H. & A. Stem 1-3 dm. high, sparingly floccose when young, glabrate in age, and glandular-puberulent in the inflorescence; leaves once or twice pinnately divided into linear divisions, floccose when young; involucre 7-8 mm. high, 10-12 mm. broad; bracts narrowly linear, obtuse; the marginal corollas with enlarged throat and limb, oblique; pappus-squamellae oblong-lanceolate to oblong-ovate, in the marginal flowers broader than in the central ones and unequal. Arid places: Ida.—Wyo.—N.M.—Calif.—Nev. Son.—Submont. Ap-Je.

4. *C. Cusickii* A. Gray. Stem decumbent, 1 dm. high or less, sparingly floccose, soon glabrate; leaves fleshy, 2-3 cm. long; involucre subtended by a linear leaf, 7-8 mm. high; bracts broadly linear; corolla white, the marginal not enlarged; pappus-squamellae 10, linear-oblong, nearly equal and equaling the corolla-tube. Sandy hills: Ore.—Ida. Submont.

5. *C. macrantha* D. C. Eat. Stem 1-2 dm. high, tomentose when young, glabrate in age, branched from the base; leaves pinnately or bipinnately divided into oblong or linear divisions, floccose when young, glabrate in age, involucre 12-15 mm. high and about as wide; bracts linear, more or less tomentose; corollas externally puberulent, all alike, white or flesh-colored; pappus of 4 linear-oblong squamellae, 4 mm. long, and sometimes some smaller ones. Hills in desert regions. Ariz.—Utah—Nev.—Calif. Son. My.

6. *C. brachiata* Greene. Stem 2-4 dm. high; leaves white-tomentose; involucre about 12 mm. high, 12-15 mm. broad; bracts linear, acute or obtuse; corollas dull white, 6-7 mm. long; pappus-squamellae 8, unequal, obtuse, 3-4 mm. long. Dry places: Utah. Son.

7. *C. achilleaeifolia* H. & A. Stem 1-2 dm. high, densely white-tomentose; leaves twice pinnately cleft with very short crowded obtuse divisions, permanently white-tomentose, involucre 8-10 mm. high and 10-12 mm. wide, tomentose; bracts linear, obtuse; corollas flesh-colored, all alike; pappus-squamellae linear, acute, 5-6 mm. long. *C. angustifolia* Greene. Dry soil and hot-spring formations. Wyo.—Utah—Nev.—Ore. Je-Au.

8. *C. imbricata* Greene. Stem branched at the base, about 3 dm. high, floccose; leaves 5-10 cm. long, with narrow divisions, yellowish; involucre 10-12 mm. high, 12-15 mm. broad, viscid-pubescent; bracts linear, obtuse; corollas flesh-colored or white, 6-7 mm. long; squamellae 8, oblong, obtuse, 4-5 mm. long. Dry places: Wash.—Ida.—Ore. Son.

9. *C. cheilanthoides* Greene. Stem about 3 dm. high; leaves 4-8 cm. long, white-tomentose; involucre 8 mm. high, 10 mm. broad, floccose and glandular; bracts linear or linear-spatulate, obtuse; corollas whitish, 6 mm. long; squamellae 8, linear, 5-6 mm. long, or those of the marginal flowers 2-4 mm. long. Dry places: Ore.—Ida.—Wash. Son.

10. *C. humilis* Rydb. Stems several from the crown; leaves 2-5 cm. long, floccose, in age glabrate, oblanceolate in outline, with oblong round-lobed divisions; involucre 7-8 mm. high, 5-10 mm. broad; bracts narrowly linear, obtuse, glandular-puberulent; corollas whitish; squamellae 8, oblong, obtuse, about 3 mm. long. Dry places: Wyo.—Ida. Plain.

11. *C. Douglasii* (Hook.) H. & A. Stem 2-5 dm. high, sparingly floccose, in age glabrate, glandular-puberulent in the inflorescence; leaves bipinnatifid with numerous short, crowded, obtuse lobes, more or less floccose; heads paniculate; involucre 10-13 mm. high, 15-20 mm. broad; bracts linear, obtuse, glandular-puberulent; pappus-squamellae oblong or linear, obtuse, about 5 mm. long. Sandy and rocky places: Alta.—N.M.—Calif.—B.C. *Plain—Mont.* Je-Jl.

12. *C. pedicularia* Greene. Stem leafy, 1-2 dm. high, decumbent; leaves twice pinnatifid, with short obtuse lobes, sparingly tomentulose when young; peduncles 1-2 cm. long; involucre about 15 mm. high and broad; bracts tomentulose, scarcely at all glandular, acutish; pappus-squamellae linear-oblong to linear, obtuse. High mountains: Colo. *Alp.* Jl.

13. *C. minuscula* Greene. Scape 1-3 cm. high; leaves crowded, 2-3 cm. long, lanceolate in outline, with short entire or toothed divisions, nearly glabrous; involucre 1 cm. high and broad; bracts linear, acute or the inner acuminate, finely glandular-puberulent; corollas white, 6 mm. long; squamellae oblong, obtuse, 3 mm. long. Mountain tops: Ida. *Alp.*

14. *C. alpina* (A. Gray) M. E. Jones. Stem 1 dm. high or less, subscapose; leaves mostly basal, twice pinnately dissected, with short obtuse lobes, somewhat tomentose when young; peduncles 2-7 cm. long, glandular-puberulent; involucre 8-12 mm. high, 10-15 mm. broad; bracts linear, obtuse, usually purple; corollas flesh-colored, all alike; pappus-squamellae linear-oblanccolate or linear-spatulate, obtuse, 4-5 mm. long. *C. rubella* Greene. High mountains—Colo.—Calif.—Ore. *Mont—Alp.* Jl—Au.

15. *C. Evermannii* Greene. Scape 1-3 cm. long, floccose; leaves 1-2 cm. long, 3-5-toothed or 3-5-lobed above the middle, loosely floccose; involucre 6-8 mm. high and broad, puberulent; bracts linear-spatulate, rounded at the apex; corollas flesh-colored or white, 5 mm. long; squamellae 8, unequal, oblong, obtuse, the longer 4-5 mm. long. Mountain tops: Ida. *Alp.*

102. ERIOPHYLLUM Lag. WOOLLY YELLOW DAISY.

Annual or perennial (in ours with a caespitose caudex), floccose or tomentose herbs or low shrubs. Leaves alternate, entire or pinnately lobed or dissected. Heads radiate, rarely discoid. Involucre hemispheric; bracts in a single series or in 2 equal series, somewhat overlapping, concave or somewhat boat-shaped, partly enveloping the marginal achenes; receptacle usually more or less convex, naked. Ray-flowers pistillate and fertile; ligules yellow, oblong. Disk-flowers usually numerous, hermaphrodite and fertile. Achenes 4-5-angled, narrowly elongate-obpyramidal, glabrous, hirsute, or glandular. Pappus of 4-12 hyaline, often erose squamellae, or rarely wanting.

Leaves entire or merely the earlier ones toothed at the apex.

Achenes glabrous or nearly so

Achenes decidedly pubescent or glandular

Leaves narrowly linear-oblanccolate or linear.

Leaves oblanccolate or obovate

Leaves more or less lobed or dissected

Achenes glabrous.

Bracts acuminate, surpassing the disk

Bracts abruptly acute, not surpassing the disk.

Achenes hairy

1. *E. pedunculatum*.

2. *E. gracile*

3. *E. integrifolium*

4. *E. multiflorum*.

5. *E. lanatum*.

6. *E. Watsoni*.

1. *E. pedunculatum* Heller. Stems several, simple, 3-5 dm. high, reddish below, sparingly tomentose; leaves oblong-lanceolate, subsessile, 3-5 cm. long, 1 cm. wide, entire, acute, floccose on both sides; peduncles 5-15 cm. long; involucre about 1 cm. high and broad, lanate; bracts 8, lanceolate, short-acuminate; ligules oblong, orange, about 1 cm. long. Dry open places: Ida. *Plain.* Jl.

2. *E. gracile* (H. & A.) A. Gray. Stems several, 2-3 dm. high; leaves narrowly linear or narrowly linear-oblanccolate, 3-5 cm. long, loosely floccose; involucre 7-8 mm. high and about as broad; bracts about 10, oblong, acutish; rays 7-8 mm. long; achenes densely glandular-granuliferous. Gravelly places: Wash.—Ida. *Plain—Submont.* Je-Jl.

3. *E. integrifolium* (Hook.) Greene. Stems numerous, decumbent at the base, 1-3 dm. high, finely tomentose; leaves linear-oblancoate, closely tomentose, 2-5 cm. long, entire or somewhat 3-lobed; involucre 6-8 mm. high and broad; bracts 8-10, elliptic, mostly obtuse; ligules orange, 7-10 mm. long; achenes hispidulous or slightly glandular above and on the margins. *E. caespitosum integrifolium* A. Gray. Hills and mountain sides: Mont.—Wyo.—Ore.—Wash. *Plain—Submont.* Je-Jl.

4. *E. multiflorum* (Nutt.) Rydb. Stem rather stout, 3-4 dm. high, loosely floccose; leaves pinnatifid, with lanceolate acute divisions, floccose; involucre fully 1 cm. high and 1.5 cm. broad; bracts oblanceolate, acuminate; ligules about 1 cm. long, glabrous. Dry places: Ore.—Mont.

5. *E. lanatum* (Pursh) Forbes. Stem 3-5 dm. high, loosely floccose; leaves more or less deeply pinnatifid, with oblong or linear, mostly obtuse divisions, loosely floccose; involucre fully 1 cm. high, usually over 15 mm. broad; bracts 10-14, oblong-lanceolate, acute or obtuse; ligules 10-15 mm. long, orange. Hill-sides and gravelly soil: B.C.—Ida.—Calif. *Submont.* My-Jl.

6. *E. Watsoni* A. Gray. Stem 1-1.5 dm. high, white-tomentose, simple or slightly branched; lower leaves cuneate-oblancoate, about 1 cm. long, 3-5-toothed at the apex, white-tomentose beneath, floccose above; stem-leaves mostly pinnatifid, with linear divisions, 1-2 cm. long, revolute-margined; involucre hemispheric, 6 mm. high, 1 cm. broad or less; bracts 9-10, acute; ligules bright yellow, 5-8 mm. long. Mountains: Ore.—Ida.—Nev. *Submont.*—Mont.

103. *ANTHERÓPEAS* Rydb. DAISY DWARF.

Low floccose annual herbs, branched at the base. Leaves alternate, spatulate to linear-spatulate, entire or 3-toothed. Heads radiate. Involucre campanulate; bracts 5-9, elliptic, distinct or nearly so, concave and slightly enfolding the ray-achenes; receptacle strongly convex or low-conic, obtuse, naked. Ray-flowers 5-9, pistillate and fertile; ligules yellow, white, or tinged with rose or purple. Disk-flowers hermaphrodite and fertile. Anthers with subulate tips. Style-branches obtuse or with conic tips. Achenes elongate, narrow, 5-angled, gradually tapering downward. Pappus of 6-12 opaque squamellae, either all elliptic and obtuse or those of the angles linear-lanceolate and produced into an awn-tip, or rarely wanting.

Pappus squamellae all oval or obovate, obtuse, leaves broadly spatulate or obovate, ligules yellow or reddish
 Pappus squamellae of the angles narrow, linear-lanceolate or linear, leaves linear or nearly so, ligules white

1 *A. Wallacei*
 2 *A. lanosum*

1. *A. Wallacei* (A. Gray) Rydb. Stem 2-10 cm. high, diffusely branched, densely floccose; leaves occasionally 2-3-toothed at the apex, 1 cm. long or less; involucre about 4 mm. high, hemispheric; bracts oblong, obtuse; ligules broadly obovate, 4 mm. long. *Eriophyllum Wallacei* A. Gray. Dry plains: Ariz.—s Utah—s Calif. *L. Son.* Ap-Je.

2. *A. lanosum* (A. Gray) Rydb. Stem 2-8 cm. high, floccose, or in age glabrate, branched; leaves floccose, 1 cm. long or less; heads campanulate, about 5 mm. high; bracts linear-elliptic, acute; ligules broadly obovate, truncate, 4 mm. long. *E. lanosum* A. Gray. Dry plains: Ariz.—s Utah—Calif. *L. Son.* Mr-May.

104. *SYNTRICHOPÁPPUS* A. Gray.

Low branched floccose annuals. Leaves alternate, from linear to spatulate, entire or 3-lobed at the apex. Heads radiate, solitary at the ends of the branches. Involucre campanulate; bracts 5-8, oblong, concave and partly enfolding the ray-achenes; receptacle flat. Ray-flowers 5-8, pistillate and fertile; ligules yellow, or purplish, rose, and white, oval, mostly 3-lobed at the summit. Disk-flowers about 20, fertile. Anther-tips linear-lanceolate. Style-tips elongate-lanceolate, flattened. Achenes linear, obpyramidal, 5-ribbed, hairy. Pappus-squamellae dissected into numerous barbellate bristles united at the base into a wing, falling off together, or wanting.

1. *S. Fremontii* A. Gray. Stem 1 dm. high or less, branched from the base, slightly floccose; leaves spatulate or linear-cuneate, often 3-lobed at the summit, 8-15 mm. long, floccose; involucre about 6 mm. high; bracts 5, broadly oblong; ligules 5, golden yellow, 4 mm. long and fully half as wide. Desert plains: Ariz.—Utah—Nev.—Calif. *L. Son.* Ap—My.

105. TETRANEÛRIS Greene.

Perennial (all ours) or annual, caulescent or scapose, more or less villous or silky herbs. Leaves usually entire, rarely some of them lobed, alternate, either clustered at the base, or scattered along the stem, or both. Heads radiate, rarely discoid, on slender peduncles. Involucre hemispheric, or nearly so; bracts several in two subequal series; receptacle convex, naked. Ray-flowers 10-20, pistillate and fertile; ligules yellow, oblong, broad, 3- (rarely 4-) toothed; nerves 4. Disk-flowers many, hermaphrodite and fertile; corollas with 5 short pubescent teeth. Anther-tips broad, triangular or ovate. Style-branches dilated, truncate, somewhat penicillate at the tips. Achenes obpyramidal, 5-angled, about 3 times as long as broad, densely hirsute. Pappus of about 5 hyaline squamellae, with a strong midrib, which sometimes is produced into an awn.

Heads sessile among the leaves.

1. *T. depressa*.

Heads distinctly peduncled

Stems scapiform, leafy only at the base

Leaves appressed-silky.

Leaves not strongly 3-nerved on the broadened bases.

Leaves spatulate or oblanceolate, 2-4 cm. long; scape stout, 5-10 cm. high.

2. *T. septentrionalis*.

Leaves linear or linear-oblanceolate; scape 10-20 cm. high

3. *T. acaulis*

Leaves silvery-silky; ligules 6-8 mm. long

4. *T. simplex*

Leaves greenish, sparingly silky, ligules 8-10 mm. long

5. *T. trinervata*

Leaves strongly 3-nerved on the broadened bases, narrowly linear-oblanceolate

Leaves loosely villous or glabrate

Leaves, scape, and involucre decidedly villous

Involucre more than 1 cm. broad, scape 3-8 cm. long; plant densely cespitose-pulvinate, leaves not conspicuously broad-based

6. *T. lanigera*

Involucre less than 1 cm. broad; scape 1-3 cm. (rarely 3-5 cm.) long, plant loosely cespitose, leaves conspicuously broad-based

7. *T. brevifolia*

Leaves glabrous or sparingly villous, scape finely pubescent or villous (long-villous only in *T. Torreyana*)

Branches of the caudex decidedly villous at the ends, with long, at first white, but later brownish hairs

Pappus-scales lanceolate, acuminate, not awned; scape villous.

8. *T. Torreyana*.

Pappus-scales oval, awned, scape silky.

Bracts oval

9. *T. arizonica*

Bracts linear-oblong.

10. *T. Crandallii*.

Branches of the caudex not conspicuously villous

Bases of the leaves not wider than the oblanceolate or almost linear blades, branches of the caudex short and stout.

Leaves glabrous, scarcely punctate, bracts slightly shorter than the disk, ligules not strongly nerved

11. *T. epunctata*

Leaves long-hairy, distinctly punctate; bracts three-fourths as long as the disk, ligules strongly nerved

12. *T. angustifolia*

Bases of the leaves 2-4 times as wide as the linear leaf-blades, branches of the caudex or rootstock elongate.

13. *T. fastigiata*

Stems 2-3 dm. high, with 2-6 stem-leaves

Basal leaves oblanceolate to linear-oblanceolate, more than 5 mm. wide, involucre hemispheric.

14. *T. leptoclada*

Basal leaves narrowly linear-oblanceolate, less than 5 mm. wide, involucre narrower.

15. *T. Ivesiana*

1. *T. depressa* (T. & G.) Greene. Pulvinate-cespitose perennial; leaves narrowly linear or nearly so, 1-2 cm. long, 1-2 mm. wide, glabrate, hairy-tufted at the base; heads sessile; involucre about 6 mm. high and 8 mm. broad; bracts oblong, obtuse; achenes silky-strigose; pappus-squamellae ovate, tapering into an awn. *Actinella depressa* T. & G. Dry hills and mountains: Utah.

2. *T. septentrionalis* Rydb. Leaves mostly rounded at the apex, 5-8 mm. wide, canescent-tomentose, subvelutinous; scape 5-10 dm. high, rather thick,

appressed-tomentose; involucre 6-7 mm. high, 12-15 mm. broad, densely villous; bracts elliptic, rounded at the apex; ligules 8-10 mm. long, very strongly veined; pappus-squamellae ovate, abruptly short-aristate. Dry hills: Sask.—Wyo.—Ida. *Plain*. Je-Jl.

3. *T. acaulis* (Pursh) Greene. Leaves crowded, narrowly linear-oblanccolate, 2-8 cm. long, 2-6 mm. wide, mostly acutish; involucre 7-8 mm. high, 10-15 mm. broad, hemispheric, silky-villous; bracts linear to oblong, or spatulate, obtuse; ligules 6-8 mm. long, yellow with orange veins; pappus-squamellae ovate, abruptly aristate. *Galaridia acaulis* Pursh. *Actinella acaulis* Nutt. *T. incana* A. Nels. *T. eradiata* A. Nels., a rayless form. Dry hills and plains: N.D.—Tex.—N.M.—Ida.—Mont. *Plain*—*Submont.*

4. *T. simplex* A. Nels. Leaves green, sparingly appressed-pubescent, glabrate in age, ascending or erect, 2-5 mm. wide, acute; involucre 12-18 mm. broad, 8-10 mm. high, silky-villous; ligules 8-10 mm. long, 4-7 mm. wide, golden yellow, with orange veins; pappus-squamellae lance-ovate, abruptly aristate. *A. simplex* A. Nels. Dry hills: S.D.—Colo.—Wyo. *Plain*. Je-Jl.

5. *T. trinervata* Greene. Leaves 3-5 mm. long, 1-5 mm. broad, more or less appressed-silky, with tufts of brown hairs at the bases; scape 5-15 cm. long, appressed-silky; involucre hemispheric, 5-6 mm. high, about 1 cm. broad, appressed-silky; bracts linear-oblong, obtuse; ligules about 8 mm. long; pappus-squamellae ovate, aristate. Dry hills: N.M.—Colo. *Son.*—*Submont.* Jl-O

6. *T. lanigera* Daniels. Leaves numerous, linear-oblanccolate, 2-5 cm. long, 2-5 mm. broad, somewhat silky when young, in age with loose brownish pubescence, with tufts at their bases; scape 3-6 cm. long, loosely silky-villous; involucre 10-15 cm. broad, 7-8 mm. high, villous; bracts oblong, obtuse; ligules 8-10 mm. long; pappus-squamellae lance-ovate, rather gradually aristate. *A. lanata* Nutt., not Pursh. Mountains: Colo.—Wyo. *Submont.*—*Mont.* Je-Jl

7. *T. brevifolia* Greene. Branches of caudex densely covered with the scarios bases of old leaves; leaves narrowly oblanccolate, 1-2 cm. (rarely 2.5 cm.) long, 2-3 mm. wide, silky-villous, rather densely so; involucre about 7 mm. high and 1 cm. broad or less, densely silky-villous, ligules pale yellow, with orange veins, 5-7 mm. long; pappus-squamellae ovate, abruptly aristate, nearly as long as the corollas. *T. acaulis caespitosa* A. Nels. *Actinea integrifolia* Torr., not Kunth. Foothills and mountains: Colo.—Wyo. *Submont.*—*Mont.* My-Je

8. *T. Torreyana* (Nutt.) Greene. Leaves narrowly oblanccolate or spatulate, 3-5 cm. long, 3-6 mm. broad, glabrous or with a few scattered hairs; scape more or less villous, 3-8 cm. high; involucre 9-10 mm. high and about 15 mm. broad; bracts linear, slightly villous and scarious-margined; ligules 10-12 mm. long, 3-6 mm. broad; pappus-squamellae lanceolate or lance-ovate, acuminate. *A. Torreyana* Nutt. *A. glabra* A. Nels., not Nutt. Rocky hills: Wyo.—Colo.—Utah. *Plain*—*Submont.* My-Je.

9. *T. arizonica* Greene. Leaves linear-oblanccolate, 3-5 cm. long, 3-6 mm. wide, sparingly pilose; scapes 5-20 cm. long, appressed-pubescent or glabrate; involucre about 8 mm. high and 15 mm. broad; bracts oblong or oval, obtuse, villous, often with brownish margins; ligules 7-10 mm. long; pappus-squamellae broadly ovate, abruptly aristate. *T. pilosa* Greene, a more glabrous plant. Dry regions: Ariz.—Nev.—s Colo.—N.M. *Son.*—*Submont.* My-Jl.

10. *T. Crandallii* Rydb. Leaves narrowly linear-oblanccolate, 4-6 cm. long, 2-3 mm. wide, sparingly long-hairy, soon glabrate; scape 1-3 dm. long, sparingly strigose; involucre hemispheric; bracts about 8 mm. long, linear-oblong, silky; ligules about 15 mm. long; pappus-squamellae ovate, aristate. Dry hills: Colo. *Plain*—*Submont.* My-Je.

11. *T. epunctata* A. Nels. Leaves glabrate or with few scattered hairs, indistinctly punctate, narrowly oblanccolate, 2-4 cm. long; scape about 1 dm. high, sparsely silky-strigose; involucre about 8 mm. high and 15 mm. broad, silky-villous; bracts elliptic or oblong; ligules bright yellow, 10-12 mm. long; pappus-squamellae obovate, abruptly aristate. *T. glabra* Greene, in part. *T.*

glabriuscula Rydb. *A. epunctata* A. Nels. Dry hills: Colo.—N.M.—Utah. *Submont.—Mont.* Je-Jl.

12. *T. angustifolia* Rydb. Leaves narrowly linear-ob lanceolate, 4–10 cm. long, 4–5 mm. wide, loosely and sparingly long-villous, or glabrate in age; scape 2–3 dm. high, strigose; involucre hemispherical, 10–12 mm. wide; bracts oblong, obtuse, densely villous; ligules about 1 cm. long; pappus-squamellae ovate, acuminate. Dry rocky hills: Colo.—Tex.—N.M. *Plain—Submont.* Mr–O.

13. *T. fastigiata* Greene. Leaves basal, very narrowly linear-ob lanceolate, 2–4 cm. long, 1–2 mm. wide, strongly punctate, glabrous or with a few long hairs near the base; scape 5–10 cm. long, striate, punctate and sparingly strigose; involucre about 5 mm. high and 10 mm. wide, hemispheric; bracts elliptic, obtuse; ligules light yellow, about 10 mm. long and 5 mm. wide; pappus-squamellae ovate, acuminate. *T. stenophylla* Rydb. *A. fastigata* A. Nels. Dry plains: Kans.—Colo.—Tex. *Plan.* My–Jl.

14. *T. leptoclada* (A. Gray) Greene. Stem 1–3 dm. high, sparingly appressed-pubescent; basal leaves glabrate or slightly hairy, hairy-tufted at the base, 3–6 cm. long, 4–6 mm. wide; stem-leaves linear, few; involucre 7–8 mm. high, 12–15 mm. broad, more or less villous; outer bracts oblong, lanceolate or linear, the inner elliptic, oval, or somewhat obovate, rounded; ligules 8–10 mm. long; pappus-squamellae ovate, gradually aristate. *A. leptoclada* A. Gray. *T. mancosana* A. Nels. *T. intermedia* Greene, a form with somewhat narrow bracts. Dry hills: Colo.—N.M.—Utah. *Submont.—Mont.* Ap–Jl.

15. *T. Ivesiana* Greene. Stem 1–3 dm. high, sparingly pubescent; leaves all narrowly linear or lance-linear, 5–10 cm. long, 1–4 mm. wide, erect; involucre somewhat turbinate, 5–6 mm. high, 7–8 mm. broad, silky-villous; bracts elliptic, obtuse; ligules about 10 mm. long, strongly veined; squamellae lanceolate, acuminate into an awn. Cañons and hillsides: Utah—Ariz.—N.M. *Spn.*

106. RYDBERGIA Greene.

Stout caulescent perennials with taproots. Leaves alternate, once or twice ternately or quaternately divided into linear divisions, or some of them entire. Heads radiate, solitary. Involucre depressed-hemispheric; bracts in about 3 series, linear, distinct, subequal or the inner shorter, densely woolly. Receptacle convex or hemispheric, naked. Ray-flowers 15–30, pistillate, fertile; ligules yellow, elongate, 3-toothed. Disk-flowers numerous, hermaphrodite and fertile. Style-tips truncate, penicillate. Achenes obpyramidal, silky-hirsute, 5-angled. Pappus of 5 lance-subulate or linear-lanceolate attenuate squamellae with faint midrib.

Basal leaves all dissected, plant villous

Basal leaves, at least some of them, simple, plant more glabrate.

1 *R. grandiflora*.

2 *R. Brandegei*.

1. *R. grandiflora* (T. & G.) Greene. Stem 1–3 dm. high, stout, floccose, leafy; leaves once or twice pinnatifid with linear lobes, more or less floccose; involucre 2–4 cm. broad, densely white-woolly; ligules 1.5–2 cm. long, 4–5 mm. broad. *Actinella grandiflora* T. & G. High mountain sides: Mont.—N.M.—Utah. *Mont.—Alp.* Jl–Au.

2. *R. Brandegei* (A. Gray) Rydb. Stem short-villous above, glabrate below, almost scapiform, 1–2 dm. high; leaves pinnatifid, with a few linear lobes or entire and linear, glabrate; involucre 2–3 cm. wide, dark, short villous; ligules 8–10 cm. long and 4 mm. wide. *A. Brandegei* A. Gray. *R. glabrata* (Porter) Greene. High mountains: Colo.—N.M. *Mont.—Alp.* Jl–Au.

107. HYMENÓXYS Cass. COLORADO RUBBER PLANT.

Caulescent annuals, biennials, or perennials. Leaves alternate, commonly pinnatifid into narrowly linear divisions. Heads (in ours) radiate. Involucre of two series of bracts, 5–16 in each series, the outer usually narrower and more or less united at the base, rather firm, entire, acute, the inner broader, either similar, or else more or less erose on the margin and abruptly acuminate or

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flat, naked or with some bracts between the ray and disk. Ray-flowers fertile, pistillate; ligules yellow, rather narrow. Disk-flowers numerous. Style-branches with truncate subcapitate tips. Achenes obpyramidal, densely pubescent. Pappus of 5-7 lanceolate or subulate, acuminate, aristate, scarious, and nerveless squamellae.

1. **D. Hoopesii** (A. Gray) Rydb. Stem 3-10 dm. high, tomentulose when young, leafy; basal leaves petioled, 1-3 dm. long, 2-7 cm. broad, oblanceolate, several-ribbed; upper leaves lanceolate, sessile; involucre 2-3 cm. broad; ligules golden, 1.5-3 cm. long. *Helenium Hoopesii* A. Gray. Mountain valleys: Ore.—Wyo.—N.M.—Calif. *Submont.*—*Subalp.* Je—Au.

110. HELENIUM L. SNEEZEWEED.

Annual or perennial leafy herbs. Leaves alternate, narrow, impressed-punctate, more or less decurrent, producing wings on the stem. Heads usually radiate. Involucre rotate; bracts narrow, linear or subulate in 2 or 3 series, subequal or the inner shorter, at first spreading, usually soon reflexed. Receptacle from convex to ovoid or conic, naked or sometimes with a few bracts between the ray- and disk-flowers. Ray-flowers usually present, in most species pistillate and fertile, in the rest neutral and sterile; ligules large, conspicuous, 3-4-toothed or -lobed, cuneate in outline. Disk-flowers numerous, hermaphrodite and fertile; corollas yellow, brown, or purplish. Achenes truncately obpyramidal, 4- or 5-angled, with as many intermediate ribs, pubescent on the angles and ribs. Pappus of 4-8 thin scarious squamellae, with or without midrib.

Plant scabrous-puberulent throughout, bracts about equalling the disk; ligules about 1 cm. long or less

Plant glabrous or minutely puberulent, bracts much longer than the disk, ligules generally over 1 cm. long.

1 *H. montanum*.

2 *H. macranthum*.

1. **H. montanum** Nutt. Perennial; stem 3-10 dm. high, more or less puberulent; leaves lanceolate, decurrent, 5-10 cm. long, denticulate or subentire; heads numerous, paniculate-cymose; involucre about 8 mm. high, 10-15 mm. broad; ray-flowers fertile; ligules 8-10 mm. long, cuneate, puberulent beneath, golden yellow; pappus-scales lanceolate, acuminate. Meadows: Mont.—Kan.—N.M.—Wash.—B.C. *Plain*—*Submont.* Jl—S.

2. **H. macranthum** Rydb. Perennial; stem 3-12 dm. high; leaves broadly lanceolate or ovate-lanceolate, dentate or entire, thinner than in the preceding; heads with longer naked peduncles; involucre over 1 cm. high, 15-20 mm. broad; ligules 12-20 mm. long, orange. *H. grandiflorum* Nutt., not Gilb. *H. autumnale grandiflorum* A. Gray. Wet places: Mack.—Sask.—Wyo.—Ore.—B.C. *Plain*—*Submont.* Jl—S.

111. GAILLARDIA Foug. BLANKET-FLOWER.

Annual, biennial, or perennial herbs, either scapose or caulescent. Leaves alternate or basal, entire, toothed, or pinnatifid, often in the same species. Heads radiate or discoid, peduncled. Involucre saucer-shaped or rotate; bracts in 2-3 series, ovate, oblong or lanceolate, at least the upper half strongly reflexed. Receptacle convex to subglobose, alveolate, usually more or less fimbriate, the fimbriae from soft and short-conic, to elongate-subulate, stiff and awn-like. Ray-flowers usually neutral, rarely pistillate and fertile, often wanting; ligules, if present, broad, cuneate or flabelliform, deeply 3-cleft, yellow, or purple, or both. Disk-flowers hermaphrodite and fertile. Anthers auricled at the base. Style-branches appendaged; appendages from glabrous and short to hispidulous and filiform. Achenes broadly obpyramidal, about twice as long as broad, wholly or partly covered by long, stiff, ascending hairs.

Lobes of the disk-corollas acuminate, covered with moniliform hairs

Plant perennial, ligules usually wholly yellow.

Plant annual, ligules partly or wholly purple.

Lobes of the disk-corollas short and broad, acute or obtuse

Plant hirsute or villous; leaves neither coriaceous nor conspicuously punctate

Pappus-squamellae lanceolate, awn-pointed

Disk purple; leaf-segments more or less ascending.

1 *G. aristata*

2 *G. pulchella*.

- Leaves, except the earliest ones, pinnatifid with narrow divisions. 3. *G. pinnatifida*.
 Leaves entire or with broad divisions.
 Perennials with a thick root. 4. *G. gracilis*.
 Annuals or biennials, root not thick. 5. *G. Mearnsii*.
 Disk pale yellow; leaf-segments divaricate. 6. *G. flava*.
 Pappus-squamellae elliptic, mucous, or with a very short awn-tip; disk yellow. 7. *G. Pringlei*.
 Squamellae with a distinct midrib, usually minutely awn-tipped. 8. *G. arizonica*.
 Squamellae without midrib and awn-tip.
 Plant minutely and sparingly puberulent, caudex thick and woody; leaves coriaceous, conspicuously punctate. 9. *G. spathulata*.
 Plant distinctly caulescent, leaf-blades spatulate to linear. 10. *G. Parryi*.
 Plant acaulescent, scapose, basal leaf-blades broadly obovate

1. *G. aristata* Pursh. Stem 2-6 dm. high, simple, leafy, more or less hirsute and puberulent; leaves oblanceolate in outline, the lower petioled, the upper sessile, grayish-puberulent, entire, dentate, lobed, or pinnatifid; involucre 2-3 cm. broad; bracts lance-subulate, long-attenuate, surpassing the disk, hirsute-villous; disk-corollas purple; ligules wholly yellow, or purplish at the base, 1.5-3 cm. long; pappus-squamellae lanceolate, long-aristate. *G. bracteosa* Standl. Hills and plains: Sask.—S.D.—Colo.—Ore.—B.C. Submont. Je-S.

2. *G. pulchella* Foug. Stem branched, leafy, 2-4 dm. high, puberulent; lower leaves oblanceolate or spatulate in outline, petioled, puberulent, entire, dentate or sinuately pinnatifid, the upper leaves sessile, lanceolate, acute or acuminate; involucre 15-20 mm. broad; bracts lanceolate, acuminate, hirsute; disk-flowers purple; ligules 10-18 mm. long, purple below with yellow tips, or sometimes wholly purple; squamellae lanceolate, long-aristate. Plains: La.—Mo.—Neb.—Colo.—Ariz.; n Mex. Son.—Plain. Ap-Au.

3. *G. pinnatifida* Torr. Perennial, often branched at the base; stem 1-3 dm. high, leafy towards the base; leaves short-pubescent, pinnatifid, with linear or lanceolate divisions, or some of the earlier merely lobed; peduncles 1-2 dm. long; involucre 15-20 mm. broad; bracts lance-subulate, attenuate, hirsute, often purplish; ligules yellow, 10-15 mm. long; squamellae lanceolate, long-aristate. Dry plains: Tex.—Colo.—Utah—Ariz.; n Mex. Son.—Submont. My-Au.

4. *G. gracilis* A. Nels. Stems usually several, 3-5 dm. high, straw-colored, finely puberulent; leaves short-pubescent, oblanceolate in outline, 4-8 cm. long, entire, lobed, rarely sinuate-pinnatifid with obtuse lobes; involucre 1.5-2 cm. wide; bracts narrowly lanceolate, attenuate, pubescent; ligules yellow, about 15 mm. long; squamellae lanceolate, abruptly acuminate. Dry valleys and canyons: Utah. Son. My.

5. *G. Mearnsii* Rydb. Stem 1-3 dm. high, leafy only towards the base, finely pubescent; leaves oblanceolate or spatulate, petioled, 5-10 cm. long, puberulent, entire or round-lobed; peduncles 1-2 dm. high; involucre about 2 cm. broad; bracts lanceolate, acute, grayish-pubescent; ligules yellow, 10-15 mm. long; squamellae lanceolate, each gradually attenuate into a slender awn equaling the corolla. Arid places: Ariz.—Utah. Son.

6. *G. flava* Rydb. Perennial, somewhat woody at the base; stem leafy, sparingly hirsutulous, about 3 dm. high; leaves obovate in outline, 3-5 cm. long, pinnately parted with divergent oblong or lanceolate, often few-toothed divisions, hirsutulous and conspicuously punctate; involucre bracts lanceolate, long-acuminate, hirsutulous; ligules pale yellow, about 8 mm. long; squamellae 5-6 mm. long, lanceolate, the midrib produced into an awn between the lobes of the 2-cleft apex. Cañons: Utah. Son. Jl.

7. *G. Pringlei* Rydb. A subscapose annual; leaves clustered at the base, 4-6 cm. long, usually pinnately lobed or sometimes merely toothed, with ovate lobes or teeth, villous; scape 1-2 dm. high, short-pubescent; involucre bracts 8 mm. long, villous; ligules yellow, 10-15 mm. long; disk yellow, 15-18 mm. broad; squamellae 8-10, obovate, rounded or slightly retuse at the apex. Mesas: Ariz.—Utah. Son.

8. *G. arizonica* A. Gray. Annual; stem 1-3 dm. high, branched and leafy at the base, puberulent; leaves pinnatifid or lobed, with obtuse divisions, puberulent or pilose; peduncles 1-2 dm. long; involucre about 15 mm. broad; bracts lanceolate or linear, acute; disk yellow; ligules yellow, 10-15 mm. long. Dry regions: s Utah—Ariz.—Nev. *L. Son.* Mr—My.

9. *G. spathulata* A. Gray. Stem leafy, 1-3 dm. high, finely puberulent or glabrate; leaves spatulate, petioled, thick; peduncles short; involucre 15-20 mm. broad; bracts ovate-lanceolate, acuminate; disk yellow; squamellae lanceolate, long-aristate, surpassing the disk. Dry valleys: Utah. *Son.* Je—Jl.

10. *G. Parryi* Greene. Leaves petioled, ovate or obovate, all basal, thick, glabrous or minutely puberulent; peduncles 1-3 dm. high; involucre about 2 cm. wide; bracts ovate, abruptly acuminate; disk yellow; ligules yellow, 15-20 mm. long; squamellae narrowly lanceolate, short-aristate. *G. acaulis* A. Gray, not Pursh. Arid regions: s Utah—Ariz. *L. Son.* Je—Jl.

112. BOËBERA Willd. FETID MARIGOLD.

Annual or perennial herbs. Leaves opposite or the upper alternate, pinnately or bipinnately dissected. Heads usually radiate. Involucre hemispheric, turbinate or broadly campanulate, with a distinct calyculum; principal bracts 8-10, broad, thin and somewhat scarious on the margins, with 3-7 conspicuous glands; receptacle puberulent. Ray-flowers pistillate and fertile; ligules oblong to rounded-oval, yellow or orange. Disk-flowers many. Style-branches with a short conic or obtuse appendage. Achenes hirsute, more or less angled, somewhat compressed, cuneate-oblong. Pappus of 8-15 squamellae, each dissected into 5-10 bristles. [*Dyssodia* Cav., not Lour.]

1. *B. papposa* (Vent.) Rydb. Ill-scented annual; stem leafy, branched, 1-3 dm. high; leaves pinnately or bipinnately divided into linear lobes; involucre 6-8 mm. high and as broad; outer bracts linear, green, the inner 8-10, oblong, scarious, tipped, brownish green or purplish-tinged, with conspicuous oblong glands; ligules few, inconspicuous. *Dyssodia chrysanthemoides* Lag. *D. papposa* (Vent.) Hitchc. Prairies, river valleys, roadsides, and waste places: Ohio—La.—Ariz.—Mont.; Mex. *Son* —*Submont.* Jl—S.

113. THYMOPHYLLA Lag. TINY TIM.

Annual or perennial herbs. Leaves opposite or alternate, or both, pinnately dissected into narrow lobes. Heads usually radiate, peduncled. Involucre turbinate, campanulate, or hemispheric, with or without a few small accessory bracts below; principal bracts in one or two more or less distinct series, equal in length and more or less united, each with 1-5 glands towards the tip. Receptacle naked. Ray-flowers pistillate and fertile, rarely wanting. Disk-flowers hermaphrodite, fertile. Style-tips obtuse or truncate. Achenes clavate, 4-5-angled. Pappus of normally 10 (rarely 11-20) squamellae most often in two series. [*Hymenatherum* Cass. *Lowellia* A. Gray.]

Annuals, pappus-squamellae muticous.

Perennials, pappus-squamellae awn-tipped.

1 *T. aurea*

2 *T. Thurberi*.

1. *T. aurea* (A. Gray) Greene. Glabrous annual; stem branched from below, leafy, 1-1.5 dm. high; leaves alternate, pinnately parted into 7-9 linear-filiform divisions; involucre 4-5 mm. high, 5-6 mm. broad; bracts oblanceolate, with conspicuous glands; ligules about 12, oblong, 5-6 mm. long; pappus of 6-8 quadrate or oblong, erose-truncate scales. *Lowellia aurea* A. Gray. *Hymenatherum aureum* A. Gray. *Dyssodia aurea* A. Nels. Dry plains: Colo.—Tex.—N.M. Je—O.

2. *T. Thurberi* (A. Gray) Woot. & Standl. Suffrutescent perennial; stems much branched, 1-2 dm. high, puberulent or glabrate; leaves pinnatifid, with filiform divisions, more or less finely short-pilose; involucre 4-6 mm. high and broad; outer bracts 1-3, subulate, very small; inner bracts linear, with triangular tips and 3-5 glands; ligules oblong, about 3 mm. long; outer pappus-squamellae

10, the inner 5, usually 3-awned, the outer 1-awned. *H. Thurberi* A. Gray. *D. cupulata* A. Nels. *D. Thurberi* B. L. Robins. Dry hills: Tex.—s Utah—Ariz.; Mex. Mr-N.

114. PÉCTIS L. LEMON-SCENT.

Rather low, branching, mostly aromatic or strong-scented, annual or perennial herbs. Leaves opposite, glandular-dotted, mostly entire, usually with several pairs of marginal bristles near the base. Heads usually small, solitary or cymose, radiate. Involucre from cylindric or oblong to campanulate or turbinate; bracts 3-12, free, in a single series, without calyculum, glandular-dotted, rounded-carinate at least below; receptacle naked. Ray-flowers few, pistillate and fertile; ligules yellow or tinged with red or purple. Disk-flowers rather few, hermaphrodite and fertile; corollas yellow. Style hispidulous, the short branches obtuse and without appendages. Achenes linear, terete or somewhat angled, pubescent or glabrate. Pappus various, of few or many squamellae, awns, or bristles, or rarely reduced to a mere crown.

Flowers subsessile; pappus of a crown of 4 or 5 connate squamellae, sometimes with 1 or 2 additional awns.

Flowers distinctly peduncled; pappus at least of the disk-flowers of 12-18 barbellate bristles.

1. *P. angustifolia*.
2. *P. papposa*.

1. *P. angustifolia* Torr. Glabrous annual, lemon-scented; stem branched, 5-20 cm. high; leaves narrowly linear; involucre 4-5 mm. high, 2-3 mm. broad; bracts linear, about 8; ligules oblong, about 3 mm. long. *P. papposa sessilis* M. E. Jones. "Sand-draws" and sandy hillsides: Tex.—Neb.—Colo.—Ariz.; Mex. Son.—Mont. Ap-O.

2. *P. papposa* A. Gray. Annual, glabrous; stem branched from the base, 5-30 cm. high; leaves narrowly linear, 3-5 cm. long; involucre about 4 mm. high and 3 mm. broad; bracts 7-9, linear; ligules 4-5 mm. long. Sandy places: Calif.—s Utah—N.M. Son. Au-O.

115. ACHILLEA (Vaillant) L. YARROW, MILFOIL.

Perennial caulescent, usually villous, herbs. Leaves alternate, from serrate to tripinnatifid. Heads several, usually radiate. Involucre campanulate to hemispheric; bracts imbricate in 3-4 series, the outer usually much shorter. Receptacle conic or convex, chaffy; paleae membranous. Ray-flowers few, 5-12, pistillate and fertile; ligules short and broad, in most species white or sometimes pink or purple. Disk-flowers 15-75, hermaphrodite and fertile; corollas yellowish white or straw-colored. Anthers with ovate obtuse tips. Style-branches in the pistillate flowers oblong, obtuse, in the hermaphrodite ones with truncate, fimbriate tips. Achenes oblong or obovate, obcompressed, callous-margined, glabrous. Pappus wanting.

Leaves pinnatifid to tripinnatifid

Bracts with dark brown, almost black margins.

Involucre 5-6 mm. high, 4-5 mm. broad

Ultimate segments of the leaves long and linear, not thickened at the apex;

bracts all acute

1. *A. borealis*.

Ultimate segments of the leaves ovate, lanceolate, or oblanceolate, short, often thickened at the apex; bracts except the outermost obtuse

Upper leaves 1-2 cm. broad, with spreading not densely crowded divisions.

Upper leaves 5-10 mm. broad, with short densely crowded divisions.

2. *A. Palmieri*.

3. *A. fusca*.

4. *A. subalpina*.

Involucre 3.5-4 mm. high, about 3 mm. broad

Bracts with light brown, yellowish, or straw-colored margins.

Involucre 5-8 mm. high, 4 mm. broad or more.

Ultimate divisions of the leaves linear, not thickened, spreading, not crowded; bracts with light brown margins.

5. *A. californica*

Ultimate divisions lanceolate or ovate, usually thickened towards the apex, ascending and crowded, bracts and their margins of the same color, light yellowish or straw-colored.

6. *A. pacifica*

Involucre 4-4.5, rarely 5 mm. high, 2.5-4 mm. broad.

Ultimate leaf-segments linear; rachis merely margined.

Ligules 2.5-4 mm. long; leaf-segments ascending, crowded.

7. *A. lanulosa*.

Ligules 1.5–2.5 mm. long; leaf-segments more or less spreading, not crowded.

8. *A. occidentalis*.

Ultimate leaf-segments ovate or lanceolate, rachis distinctly winged

9. *A. millefolium*

Leaves serrate or incised, not pinnatifid.

10. *A. multiflora*

1. *A. borealis* Bong. Stem stout, 2–4 dm. high, villous with long silky hairs; leaves linear or lance-linear in outline, 5–30 cm. long, 1–5 cm. broad, bipinnatifid; segments linear-filiform and spreading; bracts ovate or elliptic, acute, with blackish or brown margins; ligules suborbicular, 3–4 mm. broad. Benchlands and meadows Mack.—(? Wyo.)—Alta.—B.C.—Alaska; e Siberia. *Subarctic*—*Subalp.* Je—Au.

2. *A. Palmeri* Rydb. Stem 3–6 dm. high, sparingly villous; leaves usually less than 1 dm. long, 1–2 cm. wide; primary divisions ovate, spreading, the ultimate ones lanceolate, rather conspicuously punctate; heads in corymbiform panicles; bracts about 20, the outer ovate and acutish, the inner elliptic and obtuse; margins narrow, dark brown; ray-flowers usually 5; ligules suborbicular, about 4 mm. long. Mountains: Colo.—Calif.; Mex. *Submont.*

3. *A. fusca* Rydb. Stem 3–6 dm. high, long-villous; leaves 1–2 dm. long, 5–10 mm. wide, bipinnatifid, linear or the lower linear-oblongate in outline, long-villous; primary divisions short ascending, the ultimate ones lanceolate or ovate; heads in a corymbiform panicle; bracts about 20, the outer oval, the inner elliptic, all rounded or obtuse at the apex; margins dark brown, almost black; ray-flowers about 5; ligules white or pinkish, suborbicular, round-lobed, 3–4 mm. long. Hillsides: Alta.—Wash.—Yukon. *Submont.*—*Mont.*

4. *A. subalpina* Greene. Stem slender, 1–3 dm. high, villous with long hairs; leaves 3–10 cm. long, linear in outline, more or less long-villous; segments short and narrow, linear, much crowded; heads in a dense crowded corymb; bracts elliptic, with dark brown or blackish margins, the innermost usually acute, the rest obtuse; ligules 2–3 mm. long and broad. *A. lanulosa alpicola* Rydb. *A. alpicola* Rydb. High mountains: Alta.—N.M.—Nev.—B.C. *Subalp.*—*Alp.* JI—Au.

5. *A. californica* Pollard. Stem 5–10 dm. high, usually branched above, villous, with long hairs; leaves numerous, bi- or tripinnatifid, sparingly villous, the lower 10–15 cm. long, the upper sessile and clasping, lanceolate in outline; rachis merely margined; primary divisions ovate in outline, spreading, the ultimate ones linear or lance-linear, spinulose-tipped; heads in compound corymbiform panicles; bracts about 20, all obtuse or rounded at the apex; margins brown; ray-flowers 5 or 6; ligules orbicular or rounded-oval, 3–4 mm. long. Sea coast, rarely inland: Calif.—Wash.—Ida. *Son.*

6. *A. pacifica* Rydb. Stem 3–7 dm. high, sulcate, usually decidedly long-villous; leaves 1–2 dm. long, 5–20 mm. wide, linear in outline, villous, bipinnatifid; primary divisions ovate in outline, short, crowded, the ultimate ones lanceolate or ovate, strongly punctate, callous-thickened towards the spinulose-mucronate tips; heads in round-topped corymbiform panicles; bracts about 20, yellowish or straw-colored, with margins of the same color, all obtuse or rounded at the apex; ray-flowers about 5; ligules 3–4 mm. long. Plains: Wash.—Ida.—Calif. *Son.*

7. *A. lanulosa* Nutt. Stem 3–6 dm. high, copiously villous with long silky hairs; leaves 5–10 dm. long, linear in outline, densely long-villous, bipinnatifid; segments (primary and secondary) short and directed forward, the secondary linear-lanceolate; bracts elliptic, obtuse, with green midrib and straw-colored (rarely brownish) margins. Plains and mountain valleys: Sask.—Kans.—N.M.—Calif.—B.C.; adv. eastward to Ont.; n Mex. *Plain*—*Subalp.* My—S.

8. *A. occidentalis* Raf. Stem 3–6 dm. high, usually rather copiously villous with long silky hairs; leaves lanceolate in outline, 5–10 cm. long, twice or thrice pinnatifid; ultimate segments narrow, linear; involucre about 4 mm. high and 3 mm. broad; bracts elliptic, obtuse, with a green midrib and straw-colored margins. Roadsides and prairies: Pa.—S.C.—Ark.—Neb.; adv. in Colo. My—Au.

9. *A. millefolium* L. Stem 2–6 dm. high, somewhat villous, with short hairs; leaves oblong in outline, 5–10 cm. long, 8–20 mm. broad, finely villous

or glabrate, twice pinnatifid; primary segments more or less spreading, more or less decurrent into the wing-margins; secondary segments short, lanceolate, flat, spinulose-tipped; involucre 4-5 mm. high, 3-4 mm. broad; bracts lance-elliptic or elliptic, obtuse, with brown (rarely nearly black) margins; ligules 2-3 mm. long and broad. Shores, hillsides, and roadsides: Newf.—Va.—Colo.—B.C.; nat. or adv. from Eu. Je-S.

10. *A. multiflora* Hook. Stem 3-10 dm. high, villous; leaves linear, 5-10 cm. long, 5-8 mm. broad, somewhat pubescent or glabrate, pectinately cleft into lanceolate, serrulate lobes; involucre 4-5 mm. high, 4-6 mm. broad; bracts more or less villous, elliptic with brown margins; ligules 10-12, suborbicular, 1-1.5 mm. long. Valleys. Mack.—Sask.—Alaska. *Boreal.* Jl-Au.

116. *ANTHÉMIS* L. CORN CHAMOMILE.

Annual or perennial herbs. Leaves alternate, mostly pinnatifid or bipinnatifid. Heads solitary at the ends of the branches, usually radiate. Involucre saucer-shaped; bracts in about 3 series of nearly the same length, usually thin; receptacle conic to hemispheric, chaffy; paleae membranous with a distinct midrib. Ray-flowers pistillate and fertile; ligules white. Disk-flowers hermaphrodite and fertile; corollas yellow. Anthers with ovate obtuse tips. Style-branches truncate and fimbriate at the apex. Achenes subcylindric or somewhat obovoid, not angled, with filiform ribs. Pappus wanting, or a minute crown.

1. *A. arvensis* L. A leafy annual; stem 2-5 dm. high, branched, hirsute-villous; leaves 3-5 cm. long, bipinnatifid, with linear-lanceolate cuspidate lobes, hirsute-villous; involucre 4-5 mm. high, 7-12 mm. broad; bracts villous-hirsute; receptacle conic; paleae linear-lanceolate, abruptly cuspidate; ligules white, 7-12 mm. long, 3-4 mm. wide; achenes subcylindric, 10-ribbed; pappus a minute border. Field and waste places: Me.—Ga.—Ore.—B.C.; adv. or nat. from Eu.

117. *MARÛTA* Cass. MAY WEED, DOG FENNEL, DOG CHAMOMILE.

Leafy annuals. Leaves alternate, bipinnatifid, with narrow divisions. Heads radiate, solitary at the ends of the branches. Involucre saucer-shaped; bracts in 2 series, subequal. Receptacle conic, chaffy towards the apex; paleae subulate, stiff, rather persistent. Ray-flowers 10-15, neutral; ligules white. Disk-flowers hermaphrodite and fertile; corolla-tube cylindric, longer than the funnelliform throat; lobes 5, ovate, spreading. Anthers with ovate obtuse tips. Style included, with short branches truncate and fimbriate at the apex. Achenes nearly cylindric, 10-ribbed, glandular-tubercled. Pappus wanting.

1. *M. Cotula* (L.) DC. Annual, with fetid odor; stem glabrous or slightly pubescent above, 3-6 dm. high; leaves 3-5 cm. long, twice or thrice pinnatifid, with narrow linear-filiform divisions; glabrate or somewhat hairy; involucre 8-12 mm. broad; bracts oblong, obtuse, somewhat pubescent; ligules 10-18, white, about 1 cm. long, at length reflexed. *Anthemis Co'ula* L. Fields and waste places: Newf.—Fla.—Calif.—B.C.—Yukon; nat. from Eu. *Plain—Submont.* Jl-S.

118. *CHAMOMILLA* (Hall.) Gilib. CHAMOMILE, PINEAPPLE-WEED, GREEN DOG-FENNEL.

Mostly annual glabrous herbs. Leaves alternate, once to thrice pinnatifid into narrow divisions. Heads solitary or corymbose, radiate or discoid. Involucre saucer-shaped to hemispheric; bracts in 2-4 series, somewhat imbricate, obtuse, scarious-margined; receptacle conic, hemispheric, or subglobose, naked. Ray-flowers, if present, pistillate and fertile; ligules white. Disk-flowers numerous, hermaphrodite and fertile; corollas yellow; anthers with ovate obtuse tips; style-branches short, with truncate tips. Achenes usually asymmetric, with 3-5 ribs on the inner half, the back being nerveless. Pappus of a more or less developed crown or margin. [*Matricaria* L., in part.]

1. *C. suaveolens* (Pursh) Rydb. Annual; stem glabrous, very leafy, much branched, 1-4 dm. high; leaves glabrous, 2 or 3 times pinnatifid, with linear acute

lobes; involucre 7-10 mm. broad; bracts glabrous, oval to oblong, with broad scarious margins; ligules none; disk-corollas yellow, 4-lobed; receptacle conic; achenes oblong, slightly angular; pappus an obscure crown. *M. discordea* DC *M. matricarioides* (Less.) Porter. Moist and sandy places, roadsides, and waste places: Alaska—Calif.—Ariz.—N.D.; adv. or nat. eastward to Newf.—N.J.—N.Y., and in Eu. *Plain—Submont.* Mr-S.

119. *LEUCANTHEMUM* (Tourn.) Mill. OX-EYE DAISY.

Perennial herbs with rootstocks. Leaves alternate, dentate or entire or in some exotic species pinnatifid. Heads radiate, rarely discoid, solitary, rather long-peduncled at the ends of the stems. Involucre saucer-shaped; bracts many, rather narrow, in 2-4 series, somewhat imbricate. Receptacle flat or convex, naked. Ray-flowers in a single series, pistillate and fertile; ligules usually well-developed, white. Disk-corollas yellow. Anthers with ovate tips. Style of the ray-flowers slightly exserted, with short oblong branches, that of the disk-flowers included and with short branches, truncate and fimbriate at the apex. Achenes all cylindric, 10-ribbed or 10-angled. Pappus wanting.

1. *L. Leucanthemum* (L.) Rydb. Stem 3-10 dm. high, glabrous; basal leaves petioled, obovate or spatulate, coarsely dentate or incised; stem-leaves sessile, narrowly oblanceolate to nearly linear, dentate; involucre 12-15 mm. broad, bracts lanceolate, margined by a narrow brown band and a scarious margin; ligules white, 12-15 mm. long. *Chrysanthemum Leucanthemum* L. *L. vulgare* Lam. Meadows, roadsides, and pastures: Lab.—Fla.—Utah—B.C.; nat. from Eu *Plain—Submont.* My-N.

120. *TANACETUM* (Tourn.) L. TANSY.

Strongly aromatic, leafy, mostly perennial herbs, with rootstocks. Leaves alternate, once to thrice pinnatifid, conspicuously punctate. Heads corymbose, usually several or many, radiate, but the rays often inconspicuous and not exceeding the disk. Involucre hemispheric or broader; bracts in 2-3 series, usually narrow, not very unequal in length; receptacle convex, naked. Ray-flowers pistillate and fertile; ligules yellow, varying from erect, 3-lobed, concave and scarcely exceeding the disk to spreading, flat, and well developed. Disk-flowers many, hermaphrodite and fertile; corollas yellow. Style in the ray-flowers slightly exserted, in the disk-flowers included. Anthers with obtuse tips. Achenes subcylindric, those of the ray-flowers mostly 3-angled, those of the disk-flowers 5-angled. Pappus-squamellae united into a short crown.

1. *T. vulgare* L. Stout perennial; stem 5-10 dm. high, glabrous or nearly so; leaves bipinnatifid, with oblong-acute serrate divisions, glabrous or nearly so; heads numerous in a corymbiform panicle; involucre 6-10 mm. broad; flowers yellow; marginal flowers with short oblique 3-toothed limbs. Roadsides and waste places: N.S.—N.C.—Miss.; Calif.—Wash., escaped from cultivation; native of Eurasia. JI-S.

121. *SPHAEROMERIA* Nutt.

Low caespitose perennials, with a woody base, or small shrubs. Leaves alternate, often crowded at the base, pinnately or pedately divided or simple, usually silvery-canescens. Heads heterogamous but apparently discoid, few, corymbose, or in subcapitate clusters or solitary. Involucre hemispheric to broadly campanulate; bracts few, in 2 subequal series, usually broad; receptacle conic or convex, naked. Marginal flowers (functionally ray-flowers) few, pistillate and fertile, but without ligules; corollas cylindric to lance-ovoid, 3- or 4-lobed, slightly if at all oblique. Disk-flowers many, hermaphrodite and fertile; corollas with the short tube passing into the campanulate or cylindro-campanulate throat. Style of the ray-flowers short-exserted, that of the disk included; branches of the former oblong, obtuse, of the latter short, truncate and penicillate at the apex. Achenes subcylindric, tapering at the base, 5-10-ribbed. Pappus wanting.

Plant shrubby, 2-4 dm. high, glabrous; heads several, corymbose. 1. *S. diversifolia*.
Plant with caespitose caudices, 1.5 dm. or less high, silvery-canescens; heads solitary or
in a small cluster.

Heads few, clustered.

Heads more or less peduncled; basal leaves obovate-cuneate, with 3-5 round lobes
at the apex.

Heads sessile in a capitulate cluster; basal leaves once or twice ternately divided
into linear or oblong divisions.

Heads solitary, basal leaves simple, linear, or ternately cleft at the apex into linear
divisions.

1. *S. diversifolia*.

2. *S. argentea*.

3. *S. capitata*.

4. *S. simplex*.

1. *S. diversifolia* (D. C. Eat.) Rydb. Undershrub 2-4 dm. high; stem glabrous, leafy; lower leaves pinnatifid, with linear divisions, glabrous, the upper narrowly linear and entire; involucre hemispheric, 5-6 mm. broad, glabrous; bracts broadly ovate, with erose, white-scarious margins; marginal pistillate flowers 8-10. *Tanacetum diversifolium* D. C. Eat. Cañons: Utah. *Submont.* Jl-Au.

2. *S. argentea* Nutt. Stem 5-15 cm. high, silvery-canescens; leaves cuneate or flabelliform, 5-12 mm. long, 3-6-toothed or -lobed at the apex, silvery-canescens, or the uppermost oblong or linear, entire; heads few, corymbose; involucre hemispheric or campanulate, 3-5 mm. broad; bracts obovate, slightly tomentose when young, yellowish, with broad erose scarious margins; marginal pistillate flowers about 5. *T. Nuttallii* T. & G. Barren hills: Mont.—Wyo. *Submont.* My-Jc.

3. *S. capitata* Nutt. Stem 5-15 cm. high, silvery-canescens; leaves mostly basal, ternately or bi-ternately divided into linear divisions, silvery-canescens; heads 8-15; involucre 4-5 mm. broad; bracts tomentose, yellowish, obovate, erose; marginal pistillate flowers about 5. *T. capitatum* T. & G. Dry hills: Mont.—Wyo. *Submont.* My-Jl.

4. *S. simplex* (A. Nels.) Heller. Leaves mostly basal, silvery-canescens, simple and linear or 2-3-cleft, with linear divisions, only 2-3 cm. long; stem 5-12 cm. high; heads solitary, 8-10 mm. broad, hemispheric; bracts obovate, slightly canescens, yellowish; pistillate marginal flowers few. *T. simplex* A. Nels. Dry hills: Wyo. *Submont.* My-Jc.

122. PICROTHÁMNUS Nutt.

Low spiny shrubs. Leaves alternate, pedately divided and again lobed, with narrow divisions. Heads solitary or in small racemes, apparently discoid, the marginal flowers without ligules. Involucre saucer-shaped; bracts obovate-cuneate, scarious, in two more or less distinct subequal series; receptacle naked. Marginal flowers (functionally ray-flowers) few, pistillate, fertile; corolla short, deeply 2-cleft, villous; style long-exserted, with long linear obtuse branches. Disk-flowers hermaphrodite but sterile; corollas with a narrow obconic tube, a turbinate throat, and a 5-lobed limb, densely arachnoid-hairy; anthers oblong, with subulate tips and obtuse bases; style slender, with a peltate, erose stigma. Achenes ellipsoid, densely arachnoid-hairy.

1. *P. desertorum* Nutt. Spiny undershrub; stem villous-tomentose, 1-5 dm. high; leaves pedately 5-parted and again 3-lobed, with spatulate divisions, villous. *Artemisia spinescens* D. C. Eat. Desert regions: Wyo.—N.M.—e Calif.—Ore. *Plain—Submont.*

123. ARTEMÍSIA L. WORMWOOD, MUGWORT, CUDWEED, SAGE BRUSH.

Perennial or annual herbs, or shrubs, usually bitter-aromatic. Leaves alternate. Heads small, most commonly paniced and nodding when young, apparently discoid; the marginal flowers without ligules or wanting. Involucre campanulate to hemispheric; bracts in 2-4 series, at least the inner ones more or less scarious. Receptacle naked or hairy, convex or conic. Marginal flowers (functionally ray-flowers) pistillate and fertile or wanting; corollas cylindric or subcylindric and somewhat tapering upwards, 2-3-, rarely 4-toothed, often somewhat oblique; style more or less exserted, 2-cleft; style-branches linear-filiform and subterete to oblong and somewhat flattened. Disk-flowers hermaphrodite,

- Leaves linear-lanceolate, entire or short-lobed, thicker, sparingly floccose above; involucre arachnoid. 29 *A. arachnoidea*.
- Heads very numerous in dense compound panicles (except in *A. Lindleyana*), 5-25-flowered; involucre campanulate or ellipsoid.
- Upper leaves lanceolate or oblanceolate, usually more than 4 mm. wide
- Involucre 4 mm. high; leaves large, 5-15 cm. long, lanceolate or ovate-lanceolate in outline, with very few divisions, directed forward
- Lower leaves deeply divided into more or less falcate divisions. 30 *A. Hookeriana*.
- Lower leaves with shorter lobes or teeth directed forward
- Heads nodding in anthesis, 15-25-flowered, involucre rounded-campanulate. 31 *A. Douglasiana*
- Heads erect in anthesis, 5-15-flowered; involucre oblong or subcylindric 32 *A. Herriotti*
- Involucre 3 mm. high, leaves shorter, lobes of the lower leaves often spreading
- Leaves of a lanceolate type, involucre campanulate, usually less than 3 mm. broad 33 *A. ludoviciana*.
- Leaves of a cuneate type; involucre hemispheric, 3-4 mm. broad
- Leaves with 3-5 ovate teeth at the apex, dark green 34 *A. cuneata*.
- Leaves with 3-7 lanceolate lobes, yellowish green 49 *A. rhizomata*.
- Upper leaves linear or narrowly linear-oblanceolate, less than 4 mm. wide
- Heads numerous, paniculate, leaves usually more than 5 cm. long; plant not suffruticose at the base.
- Inflorescence loose; branches long and heads scattered
- Leaves entire, or the lower coarsely toothed or with short lanceolate lobes. 35 *A. silicola*.
- Leaves, at least some of them, with long narrow, alternate, salient, falcate lobes 36 *A. falcata*
- Inflorescence dense and narrow; branches short; heads crowded; stem-leaves mostly pinnatifid
- Bracts and upper surface of the leaves nearly glabrous; lower surface minutely tomentulose 37 *A. potens*.
- Bracts and upper surface of the leaves floccose; lower surface white-tomentose. 38 *A. Underwoodii*
- Heads less numerous, in narrow spikes or spike-like panicles, leaves narrow, usually less than 5 cm. long, the lower toothed or rarely lobed towards the apex, the upper entire, linear or nearly so, plant suffruticose at the base 39 *A. Lindleyana*.
- IX. GNAPHALOIDEAE.
- Leaves all entire or the basal ones merely toothed.
- Involucre 3-4 mm. high, 2-3.5 mm. broad, heads less than 25-flowered
- Corollas dark brown or purplish, leaves usually less tomentose above, the lower serrate towards the apex. 40 *A. gnaphaloides*
- Corollas light brown or yellow, leaves equally white-tomentose on both sides
- Involucre 2-2.5 mm. broad, leaves very narrow, linear or lance-linear, acute 41 *A. pabularis*.
- Involucre 2.5-3.5 mm. broad, leaves broader, if lance-linear, more or less acuminate.
- Upper leaves ovate to lanceolate, acute, heads densely crowded and usually erect. 42 *A. Purshiana*
- Upper leaves lanceolate to lance-linear, acuminate, heads less crowded, mostly spreading (Entire-leaved forms of) 46 *A. diversifolia*.
- Involucre 4-5 mm. high, 4-7 mm. broad, heads 25-40-flowered (In *A. longifolia* sometimes 20-25-flowered)
- Heads nodding or spreading, leaves equally floccose on both sides, not revolute, acute
- Heads nodding, rather long-peduncled on elongate racemiform branches, leaves linear. 43 *A. pudica*
- Heads spreading, subsessile or short-peduncled on shorter branches, stem-leaves lanceolate 44 *A. argophylla*.
- Heads erect, peduncled; stem-leaves linear-lanceolate, caudate-attenuate, often revolute-margined and greener above 45 *A. longifolia*.
- Leaves, at least the lower ones, more or less lobed or divided.
- Lower leaves with simple divisions.
- Lower leaves with long and narrow lobes.
- Involucre 3-4 mm. high, 3-4 mm. broad. 46 *A. diversifolia*
- Involucre 4-5 mm. high, 5-7 mm. broad. 44 *A. argophylla*
- Lower leaves with short and broad often salient lobes
- Leaves 5-8 cm. long; involucre 4-5 mm. high and about as broad 47 *A. platyphylla*
- Leaves 1-5 cm. long; involucre 3-4 mm. high, 2-3 mm. broad.
- Stem simple up to the inflorescence
- Inflorescence dense and much branched, heads clustered 48 *A. Brittonii*.
- Inflorescence lax, narrow, spike-like, with short racemiform branches 49 *A. rhizomata*
- Stem conspicuously branched, the branches ending in small simple or branched racemes. 50 *A. albulata*.

Lower leaves and often the upper with narrow, again cleft or toothed, spreading divisions

Heads 25-50-flowered; involucre 4-5 mm. high, 5-8 mm. broad.

Heads erect, borne singly on peduncles 1-12 mm. long; leaves equally tomentose on both sides

Heads borne in small glomerules, sessile, only the terminal one erect; leaves less tomentose above

Heads 20-30-flowered, involucre 3 mm. high, 2.5-3.5 mm. broad.

51. *A. floccosa*.
52. *A. candicans*.
53. *A. Flodmantii*.

X. DISCOLORES

Leaves densely white-tomentose beneath, loosely floccose above, at least when young.

Heads very numerous in a branched leafy panicle; leaves not revolute-margined

Heads fewer, usually in a narrow spike-like or racemiform inflorescence; leaves revolute-margined

Leaves minutely tomentulose beneath, glabrous above

Heads hemispheric, nodding at least in anthesis.

Heads campanulate, erect in anthesis.

54. *A. discolor*.
55. *A. Michauxiana*.
56. *A. graecolens*.
57. *A. tenuis*.

XI. WRIGHTIANAE.

Leaves sparingly pubescent or glabrous, green above.

Heads erect; involucre about 2 mm. broad

Heads nodding, involucre about 3 mm. broad.

Leaves white-tomentose on both sides.

58. *A. Wrightii*.
59. *A. Bakeri*.
60. *A. Carruthii*.

XII. PONTICAE.

One species

61. *A. Abrotanum*

XIII. BIOLOVIANAE.

One species.

62. *A. Bigelovii*.

XIV. TRIDENTATAE.

Involucre 4-5 mm. high, 3-5 mm. broad; heads 7-15-flowered (rarely 5- or 6-flowered).

Leaves mostly entire; heads numerous in a dense but not spike-like panicle.

Leaves, at least some of them, 3-5-toothed at the apex; heads fewer in a narrow spike-like panicle

Plant 1-3 dm. high; branches decumbent or spreading at the base.

Plant about 5 dm. high, with erect strict branches

Involucre 2-4 mm. high, 2-2.5 mm. broad; heads 1-8-flowered.

Leaves, at least some of them, 3-toothed at the apex.

Shrubs 5-50 dm. high; heads numerous in ample panicles.

Leaves cuneate.

Leaves narrowly linear-cuneate or linear

Shrub 1-4 dm. high, heads fewer

Heads glomerate in dense panicles; involucre turbinate

Heads in simple, raceme-like panicles; involucre campanulate.

Heads 7-9-flowered, involucre densely canescent

Heads 1-6-flowered; involucre nearly glabrous.

Leaves 3-cleft into linear-filiform divisions.

63. *A. cana*.
64. *A. arbuscula*.
65. *A. spiciformis*.
66. *A. tridentata*.
67. *A. angusta*.
68. *A. arbuscula*.
69. *A. nova*.
69. *A. tripartita*.

XV. RIGIDAE

One species.

70. *A. rigida*.

XVI. PYGMAEAE.

One species

71. *A. pygmaea*.

1. *A. glauca* Pallas. Perennial; stem 3-6 dm. high, silky-pubescent; leaves entire, linear, 2-5 dm. long, 2-5 mm. wide, or with a few linear divisions, silky-canescens; heads small, numerous in a large panicle; involucre about 13 mm. broad; bracts elliptic, pubescent, scarious-margined; flowers yellow. Prairies and banks: Man.—Neb.—Colo.—Alta.; Siberia. *Plain*. JI-O.

2. *A. aromatica* A. Nels. Perennial; stems mostly simple, 4-8 dm. high, glabrous; leaves mostly entire, some of the lower 3-cleft, linear, 2-7 cm. long, 2-6 mm. wide; heads numerous, in a large leafy panicle, nodding; involucre 3-4 mm. broad, glabrous; bracts elliptic, dark green with scarious margins; flowers brown, the fertile ones 10-20, the sterile more numerous. Mountain valleys: Alta.—Colo.—n Calif.—Wash.; n Mex. *Submont.*

3. *A. dracunculoides* Pursh. Perennial; stem 5-15 dm. high, glabrous; leaves narrowly linear, or some 3-cleft with similar divisions, glabrous, 3-7 dm. long, 1-3 mm. wide; heads very numerous, in a compound panicle, nodding; involucre broad, glabrous, yellowish green; bracts elliptic, obtuse; ray-flowers 10-20. Prairies and plains: Man.—Mo.—Tex.—Calif.—B.C. *Plain—Submont.*

4. *A. caudata* Michx. Biennial; stem glabrous, 5-20 dm. high; leaves 1-3-pinnately divided into linear-filiform divisions, glabrous or nearly so, the lower petioled, 7-15 cm. long; heads very numerous in a narrow panicle, nodding; involucre 2-3 mm. broad; bracts glabrous, elliptic, obtuse, yellowish green; flowers yellow. Sandy soil: N.B.—Fla.—Tex.—Colo.—Sask. Jl-S.

5. *A. Forwoodii* S. Wats. Biennial; stem 4-7 dm. high, somewhat pubescent when young; basal leaves 5-10 cm. long, petioled, bi- or tripinnatifid into narrowly linear divisions, loosely silky-canescens at least when young; heads numerous in a dense panicle, mostly erect, heterogamous; involucre subglobose, 2-2.5 mm. high, 2.5-3 mm. broad; bracts in 3-4 series, the outermost lanceolate or ovate, acute, half as long as the innermost ones; ray-flowers 15-20. *A. caudata calvens* Lunell. Plains: Ont.—Mich.—Neb.—Sask. Plain.

6. *A. pacifica* Nutt. Perennial; stem 4-10 dm. high, glabrate or sparingly pubescent when young, often purplish, leaves 1-2 cm. long, twice pinnatifid, with narrowly linear divisions; heads very numerous, in a leafy panicle, at first nodding, soon erect; involucre subglobose, about 2.5 mm. high, 2.5-3 mm. broad; bracts glabrous or sparingly short-hairy, scarious-margined; outermost bracts ovate, acute, about half as long as the inner ones; ray-flowers 8-12; corollas glabrous. *A. desertorum Scouleriana* Besser. *A. Scouleriana* Rydb. Plains: Alta.—B.C.—Ore.; (? Colo.).

7. *A. camporum* Rydb. Perennial; stem 3-5 dm. high, striate, often purplish; basal leaves clustered, 4-10 cm. long, petioled, twice or thrice pinnatifid into linear or oblong divisions, more or less silky-canescens; upper stem-leaves sessile, pinnatifid, with narrowly linear divisions; heads numerous in a narrow leafy panicle, nodding; involucre hemispheric, 2.5-3 mm. high and fully as broad; bracts in 3-4 series, scarious-margined, the outermost ovate, obtuse, a little more than half as long as the innermost ones; ray-flowers 15-20. *A. canadensis* Nutt., not Michx. *A. Forwoodii* Rydb. (Fl. Colo.), not S. Wats. Plains and hills: Ont.—Sask.—Neb.—Ariz.—Yukon. Plain—Submont.

8. *A. MacCallae* Rydb. Perennial; stem 2-3 dm. high, rather strict, more or less canescens, sometimes purplish; basal leaves 5-10 cm. long, petioled; blades ovate in outline, twice pinnatifid, with rather few, linear or narrowly oblanceolate divisions, silky-canescens; upper stem-leaves less divided; heads rather numerous, in narrow panicles; involucre 3 mm. high, 4-5 mm. broad; bracts green with yellowish scarious margins, acutish, sparingly long-hairy or glabrous; outer bracts ovate, about half as long as the inner broadly oval ones; ray-flowers 10-15. Gravelly slopes: Alta.—Yukon—Wash.—Colo. Plain—Submont.

9. *A. Bourgeauana* Rydb. Perennial; stem 3-4 dm. high, rather densely silky-villous, more or less tinged with red; basal leaves clustered, 4-6 dm. long, petioled, sericeous-canescens on both sides, twice pinnatifid, with oblanceolate divisions; stem-leaves mostly sessile, rather small, with linear divisions, or 3-fid or entire; heads very numerous, in dense leafy panicles; involucre hemispheric, about 4 mm. high and 5 mm. broad; bracts yellowish, silky-villous, scarious-margined, the outermost about half as long as the innermost, ovate, acute; ray-flowers about 20. Plains: Sask.—N.D. Plain.

10. *A. spithamea* Pursh. Perennial; stem 1-3 dm. high, sericeous; basal leaves pinnately or bipinnately divided into oblanceolate lobes, silky-canescens on both sides; upper leaves reduced, linear or with linear lobes; heads comparatively few, in a spiciform inflorescence; involucre 4-5 mm. broad; bracts oval, silky or glabrate, with brownish green centres, and scarious margins; flowers brown or purplish. *A. borealis* Am. auth. *A. groenlandica* Wormsk. Subarctic, arctic, and alpine regions: Greenl.—Que.—Mont.—Colo.—Wash. Subalp.—Alp. Jl-Au.

11. *A. filifolia* Torr. Undershrub, 3-10 dm. high; branches erect, minutely tomentulose, leafy; leaves all slender, entire and filiform, or some 3-parted with filiform divisions, minutely tomentulose, more or less fascicled; heads very small and very numerous, in narrow leafy panicles; involucre 1-1.5 mm. broad, to-

mentulose, 3-5-flowered; sterile central flowers 1-3. *A. plattensis* Nutt. Plains: Neb.—Tex.—Ariz.—Nev.; Mex. *Son.*—*Plain.* Ap-O.

12. *A. pedatifida* Nutt. Perennial, with a thick woody caespitose caudex; stems 5-15 cm. high, finely canescent; leaves mostly basal, once or twice ternately divided into linear or narrowly spatulate divisions, finely white-tomentulose; heads few in a spicate or racemose inflorescence, 12-15-flowered; involucre 3-4 mm. broad, tomentose; bracts elliptic; flowers brownish. Arid ground: Wyo.—Mont.—Ida. *Submont.* Je-Au.

13. *A. Absinthium* L. Shrubby; stem 5-15 dm. high, finely canescent; leaves 5-12 cm. long, once to thrice pinnately divided into oblong or lanceolate, obtuse divisions, finely canescent, especially beneath; heads numerous in a large panicle, with racemiform branches, nodding; involucre 4-5 mm. broad, canescent; outer bracts linear, the inner oval, scarious-margined. Waste places and around dwellings: Newf.—N.C.—Mont.; escaped, native of Eu. Au-S.

14. *A. frigida* Willd. Perennial, with a caespitose, suffrutescent caudex; stem 2-5 dm. high, finely canescent; leaves twice pinnatifid, with linear-filiform divisions, silvery-white, in age often turning brownish; heads numerous, racemously disposed, nodding; involucre 4-6 mm. broad, canescent or tomentose; bracts oblong or lanceolate; corollas yellow, glabrous. Dry plains and hills: Hudson Bay—Tex.—Ariz.—Ida.—Alaska; Asia. *Plain*—*Mont.* Jl-O.

15. *A. scopulorum* A. Gray. Perennial, with a caespitose caudex; stem simple, canescent, 1-2 dm. high; lower leaves petioled, 3-7 cm. long, bipinnatifid, with linear or oblong divisions, silky-canescenscent; upper stem-leaves small and less divided; heads 3-12, spicately or racemously disposed, 18-30-flowered; involucre 6-8 mm. broad; bracts oval, tomentose, black- or brown-margined; corollas yellow, hirsute at the summit. High mountains: Mont.—N.M.—Utah. *Subalp.*—*Alp.* Jl-S.

16. *A. Pattersoni* A. Gray. Perennial, with a caespitose caudex; stem white-tomentose; lower leaves pinnatifid, with 3-5 linear divisions, sericeous; upper stem-leaves linear, entire or 2-3-cleft at the apex; heads 1-5, usually conglomerate, 8-12 mm. broad; bracts oblong or elliptic, white-tomentose with brown or black margins; flowers yellow, 40-50, the central ones fertile; receptacle villous. Alpine peaks: Colo. *Subalp.*—*Alp.* Jl-Au.

17. *A. biennis* Willd. Biennial; stem 3-10 dm. high, glabrous; leaves pinnately or bipinnately parted into lanceolate, laciniate-dentate divisions, glabrous; heads small, numerous, in a dense leafy panicle; involucre 2-3 mm. wide, glabrous; bracts elliptic, dark-green, scarious-margined; corollas yellow, glabrous. Wet places: N.S.—N.J.—Calif.—B.C.—Mack. *Plain*—*Mont.* Au-D.

18. *A. minuta* Rydb. A low undershrub, woody at the base; stems 1 dm. high or less, at first slightly tomentose, in age glabrate and reddish; leaves mostly basal, silvery-silky, about 1 cm. long, pinnatifid, with 5-7 narrowly oblanceolate approximate divisions; stem-leaves smaller, with linear-filiform divisions; inflorescence simple, spike-like, 2-4 cm. long; involucre hemispheric, 2.5 mm. high; bracts about 10, light brown, slightly tomentose, in age glabrate, ovate, acutish, scarious-margined. Plains: Alta. *Plain.*

19. *A. Tyrrellii* Rydb. Tufted perennial; stems 2-3 dm. high, densely silky-canescenscent; leaves 1.5-3 cm. long, white-silvery on both sides, the basal ones twice pinnatifid, with 3-5 crowded primary divisions, which are 3-5-cleft into oblanceolate or spatulate divisions; upper leaves ternate to entire and linear; heads racemose, nodding; involucre hemispheric, about 5 mm. high and 7 mm. broad; bracts 12-15, elliptic, densely canescent on the back, with conspicuous dark brown scarious margins; ray-flowers about 10; disk-flowers about 30. Mountains: B.C. *Subalp.* S.

20. *A. saxicola* Rydb. Perennial, with a caespitose caudex; stem decumbent at the base, 1-3 dm. high, loosely villous; basal leaves petioled, 2-8 cm. long, twice pinnately parted into lanceolate divisions, loosely villous; heads several, racemously disposed, some of them, at least the lower, on long erect peduncles, nodding; involucre 8-10 mm. broad, villous; bracts elliptic with black or dark

brown margins; corollas yellow, loosely pubescent. *A. norvegica* A. Gray, not Fries. Higher mountains: Colo.—Alta. Mont.—Alp. JI-S.

21. *A. arctica* Less. Perennial, with a caespitose caudex; stem 2-4 dm. high, glabrous or sparingly pubescent above; lower leaves petioled, 5-15 cm. long, twice pinnately parted, with lanceolate, acute or acuminate divisions, slightly pubescent or glabrate, the upper leaves less divided, smaller and sessile; heads several, in racemose inflorescence, nodding, the lower usually on elongated peduncles; involucre 8-10 mm. broad; bracts elliptic, sparingly hairy, with black or dark brown margins; corollas yellow, usually pilose. *A. norvegica pacifica* A. Gray. *A. longepedunculata* Rudolphi. Arctic, subarctic, and alpine situations: Yukon—B.C. (Selkirk Mts.)—Wash.—Alaska; Asia. Au-S.

22. *A. laevigata* Standl. A low perennial, with a rootstock; stems 2.5-3 dm. high, glabrous, reddish, striate; basal leaves slender-petioled, twice pinnatifid into oblong-linear, acute divisions, glabrous, 2-6 cm. long; stem-leaves mostly once pinnatifid into narrow acute divisions; heads 5-8, nodding, in a racemose inflorescence; involucre 8-10 mm. broad; bracts glabrous, ovate, obtuse, green on the back, with broad dark brown erose margins; ray-flowers 5-10. Mountains: Alta. Subalp.

23. *A. Parryi* A. Gray. Perennial, with a caespitose caudex; stem glabrous, 2-4 dm. high; leaves twice to thrice pinnatifid, with linear divisions, glabrous; heads rather many, racemosely or paniculately disposed, nodding; involucre 5-7 mm. broad, glabrous; bracts elliptic or oval with light brown margins; corollas yellow, glabrous. Alpine peaks: Colo.—e Utah. Subalp. Au.

24. *A. franserioides* Greene. Perennial, with a rootstock; stem 3-10 dm. high, minutely puberulent or glabrous; leaves twice or thrice pinnatifid, with oblong, obtusish divisions, green and glabrous above, pale and usually minutely tomentulose beneath; heads numerous, in a narrow panicle, nodding; involucre about 6 mm. broad, sparingly tomentose; outer bracts linear, green, the inner oblong, scarious-margined; corollas 40-90, glabrous; marginal flowers few. Mountains: Colo.—N.M.; Mex. Submont. JI-S.

25. *A. vulgaris* L. A stout perennial, with a rootstock; stem 5-15 dm. high, sparingly tomentose when young; lower and middle leaves ovate in outline, pinnately or bipinnately divided to near the midrib, green and glabrate above, white-tomentose beneath, 5-10 cm. long; primary divisions 5-7, obovate, oblong, or oblanceolate, acute, the ultimate lanceolate, often few-toothed; upper leaves pinnatifid, with lanceolate or linear divisions, or simple; heads very numerous in a leafy panicle; involucre about 4 mm. high, 3-4 mm. broad, more or less tomentose; bracts ovate to oblong, obtuse; ray-flowers 6-12. Waste places: Newf.—Man.—Wis.—Ala.—Ga.; B.C.; escaped from cultivation; native of the Old World.

26. *A. incompta* Nutt. Perennial, with a creeping rootstock; stem 3-6 dm. high, glabrate or at first slightly floccose; leaves soon glabrate above, tomentose beneath, the lower obovate or oblanceolate in outline, 3-10 cm. long, often bipinnatifid with lanceolate, acute divisions, the upper narrower and merely pinnately cleft; heads numerous, in a narrow panicle; involucre glabrous or nearly so, about 4 mm. broad; bracts oval, scarious-margined; corollas brownish. *A. discolor incompta* A. Gray. Hillsides: Mont.—Colo.—Calif.—B.C. JI-Au.

27. *A. elatior* (T. & G.) Rydb. Perennial, with a creeping rootstock; stem 5-10 dm. high, glabrous or slightly floccose; leaves glabrous or nearly so above, tomentose beneath, acuminate, 5-10 cm. long, the lower pinnatifid, with lanceolate, long-acuminate lobes, the upper trifid or entire; heads numerous, in a panicle, nodding; involucre about 5 mm. broad, shining, nearly glabrous; bracts with yellowish or brownish scarious margins, oval; corollas yellow or brownish. *A. Tileni elatior* T. & G. Valleys: Mack.—Hudson Bay—Mont.—Wash.—Alaska. Submont.—Subalp. JI-S.

28. *A. Leibergii* Rydb. A suffrutescent perennial, 3-6 dm. high, with a woody caudex and short perennial stems; branches erect, simple, sparingly tomentulose or glabrate, striate; leaves 3-6 cm. long, oblanceolate, coarsely

toothed or lobed towards the apex, or the upper entire, glabrous and yellowish green above, finely floccose beneath; heads many in a dense spike-like panicle; involucre hemispheric, about 4 mm. high, 4-5 mm. broad; bracts yellowish, only sparingly floccose, ovate, oval, acutish, broadly scarious-margined; ray-flowers 5-7. Plains: Wash.—n Ida. *Son.*—*Submont.*

29. *A. arachnoidea* Sheld. A perennial, with a branched rootstock or caudex; stem 5-10 dm. high, striate, arachnoid-floccose; leaves linear-lanceolate, acuminate or acute, sessile, sparingly floccose but soon glabrate above, permanently floccose beneath, 3-8 cm. long, the lower with a few lanceolate short lobes; heads many, in a lax panicle, often sub-secund and nodding; involucre hemispheric, about 4 mm. high and 6 mm. broad; bracts about 10, sparingly floccose, yellowish green, ovate to elliptic, acute or obtuse, scarious-margined; ray-flowers 8-10. Banks: Ore.—Ida. *Son.*

30. *A. Hookeriana* Besser. Tall perennial, with a rootstock; stem 3-6 dm. high; leaves lanceolate or ovate in outline, glabrate above, densely white-tomentose beneath, the upper entire, the lower deeply cleft into 3-7 lanceolate often falcate divisions; heads numerous, in very dense elongate panicles, mostly erect; involucre about 4 mm. high and 3 mm. broad, more or less tomentose; bracts ovate to elliptic, obtuse, scarious-margined; ray-flowers 5 or 6. Valleys: Sask.—B.C.—Ore. *Plain.*

31. *A. Douglasiana* Besser. Stout perennial, with a rootstock; stem 6-10 dm. high; leaves numerous, 5-15 cm. long, lanceolate, acuminate, the lower more or less lobed or toothed, with few lanceolate lobes or teeth, the upper ones entire, all somewhat grayish-floccose above when young, permanently white-tomentose beneath; heads numerous, at first nodding, in a large dense narrow leafy panicle; involucre 4 mm. high, 3-4 mm. broad; bracts tomentose, at least when young; the outer lanceolate, acutish, the inner elliptic, obtuse, broadly scarious-margined above; ray-flowers 6-8. *A. vulgaris californica* Besser. *A. Kennedyi* A. Nels. Banks: Wash.—Ida.—s Calif. *Son.*—*Submont.*

32. *A. Herriotii* Rydb. Tall perennial, with a rootstock; stem simple, 6-10 dm. high, finely tomentose; leaves entire or sparingly and sharply toothed, 5-20 cm. long, glabrate and green above, densely white-tomentose beneath; heads very numerous, erect, in a narrow dense panicle; involucre 4-5 mm. high, 2.5-3 mm. broad; bracts tomentose, the outer ovate-lanceolate, acute; inner bracts elliptic, mostly obtuse; ray-flowers 6-8. Banks: Alta.—Sask.—S.D. *Plain.*

33. *A. ludoviciana* Nutt. Perennial, with a caespitose rootstock; stem usually branched, more or less tomentose, 3-6 dm. high; lower leaves oblanceolate, 3-7-lobed above the middle, 3-8 cm. long, soon glabrate and dark green above, densely white-tomentose beneath; lobes lanceolate and falcate; upper leaves lanceolate and entire; heads very numerous and small, in a compound open panicle; involucre 3-4 mm. high, 2-3 mm. broad, usually densely tomentose; bracts elliptic; corollas light brown. Prairies, cañons, and mountain sides: Mo.—Tex.—Ariz.—Utah. *Plain*—*Submont.* Au-S.

34. *A. cuneata* Rydb. Perennial, with a creeping rootstock; stem 5-10 dm. high, tomentose, branched; leaves sessile, 2-4 cm. long, grayish floccose above, white-tomentose beneath, those of the stem cuneate-obovate, pinnatifid, or coarsely toothed towards the apex, the lobes or teeth ovate, often mucronate; leaves of the inflorescence lanceolate and entire; heads numerous, hemispheric, about 3 mm. broad; bracts oval, obtuse, tomentose, the inner scarious-margined; ray-flowers 6 or 7. Banks: Colo.—Tex. *Son.*—*Submont.* Au-S.

35. *A. silvicola* Osterhout. Perennial, with a creeping rootstock; stem 4-6 dm. high, slender, sparingly tomentose; leaves linear or linear-lanceolate, 4-6 cm. long, 3-8 dm. wide, entire or with a few sharp teeth, acuminate, glabrate above, densely silvery-tomentose beneath; inflorescence loosely paniculate, 2-3 dm. long; heads numerous, nodding; involucre about 5 mm. broad, tomentose, but not very densely so; bracts oblong; ray-flowers 10-15. Mountains and prairies: Tex.—Colo.—Utah—Calif.; n Mex.—Ariz.—Ida. *Son.*—*Submont.* Au-S.

36. *A. falcata* Rydb. Tall perennial, with a rootstock; stem 6–10 dm. high, loosely floccose; leaves linear or narrowly linear-lanceolate, 10–15 cm. long, green and glabrate above, white-tomentose beneath, the upper simple, falcate, the lower usually with several alternate, spreading and strongly falcate, narrow lobes; panicle very large; involucre about 4 mm. high and fully as broad, densely floccose; outer bracts ovate, acute, the inner oval and obtuse; ray-flowers 5–7. Banks: S.D.—Sask. *Plain*. Au–S.

37. *A. potens* A. Nels. Perennial, with a creeping rootstock; stem simple, pale green, 4–8 dm. high; leaves 3–6 cm. long, sessile, pale and glabrate above, thinly tomentose beneath, with somewhat revolute margins, linear, simple or pinnatifid, with 2–4 divaricate lobes; heads numerous in a dense narrow panicle, crowded; involucre 3 mm. high and as broad; bracts 8–10, nearly glabrous, the outer ovate, acute; inner bracts oval, obtuse; ray-flowers 10–12. Banks: Calif.—Mont.—B.C.

38. *A. Underwoodii* Rydb. Perennial, with a horizontal much-branched rootstock; stem slender, 2–6 dm. high, somewhat floccose; leaves 3–5 cm. long, pinnately parted, with 3–7 (usually 5) linear or linear-lanceolate acute lobes, densely white-floccose beneath, green and slightly tomentose above, in age glabrate; panicle narrow; heads crowded; involucre 3 mm. high and 2.5 mm. broad; bracts ovate, tomentose, slightly scarious on the margin. Hills and mountain sides: Nev.—Colo.—Ariz.—Calif.—B.C. *Plain—Submont*. Jl–S.

39. *A. Lindleyana* Besser. Perennial, with a caespitose rootstock; stem 1–4 dm. high, slender; leaves lanceolate to linear, 1–3 cm. long, entire or the lower with sharp teeth, floccose when young, soon glabrate above, more or less permanently tomentose beneath, inflorescence narrow, racemiform, or with short erect branches; involucre 3–4 mm. high, 2–3 mm. broad, tomentose. Rocky banks: Wash.—w Mont.—Ariz.—n Calif. *Son.—Submont*. Jl–S.

40. *A. gnaphaloides* Nutt. Perennial, with a slender, horizontal, caespitose rootstock; stem 3–6 dm. high, white-tomentose; lower leaves oblanceolate, entire or serrate, 2–10 cm. long, tomentose on both sides; upper leaves lanceolate or linear, entire; heads very numerous, in rather dense panicles; involucre about 4 mm. high, 2–3 mm. wide, about 20-flowered. Prairies and river banks: Ont.—Mo.—Tex.—Colo.—Alta., adv. eastward to N.H. and N.Y. *Plain—Submont*.

41. *A. pabularis* (A. Nels.) Rydb. Perennial, with a creeping rootstock; stem 2–4 dm. high, slender, white-tomentose; leaves linear or narrowly linear-lanceolate, the lower often toothed, densely tomentose, inclined to become yellowish, 3–5 cm. long; heads small, in a narrow spike-like inflorescence; involucre tomentose, about 3 mm. high and 2 mm. broad, about 15-flowered. *A. rhizomata pabularis* A. Nels. Saline soil: S.D.—Neb.—Colo.—Ida. *Plain*. Jl–Au.

42. *A. Purshiana* Besser. Perennial, with a horizontal rootstock; stem 3–6 dm. high, tomentose; leaves ovate to lanceolate, entire or the lower somewhat toothed, white-tomentose on both sides; heads small, in a dense, contracted panicle; involucre about 3 mm. high, 2 mm. broad, tomentose; flowers about 15. Plains: Sask.—Neb.—Calif.—B.C. *Plain—Submont*. Au–O.

43. *A. pudica* Rydb. Perennial, with a horizontal rootstock; stem 4–6 dm. high, simple up to the inflorescence, white-floccose; leaves linear or narrowly linear-lanceolate, 6–10 cm. long, 6–8 mm. wide, entire, white-floccose on both sides; inflorescence a narrow panicle; involucre campanulate, about 5 mm. high and 4 mm. broad; bracts ovate, densely tomentose, with a darker midrib and slightly scarious margin; flowers about 20, yellow. Mountains: Colo. *Submont*. Jl–Au.

44. *A. argophylla* Rydb. Perennial, with a strong rootstock; stem 5–10 dm. high, white-tomentose, angled; leaves many, lanceolate, entire, or the lower oblanceolate, sometimes coarsely toothed or with lanceolate lobes, 5–10 cm. long, white-tomentose on both sides, acute; heads numerous in a leafy panicle; involucre hemispheric, 4–5 mm. high, 5–7 mm. broad, densely tomentose; bracts 12–14, the outer lanceolate, acute; inner bracts elliptic or oval, obtusish; flowers 25–40; corollas yellow. Valleys: Colo.—Wyo.—Wash.—n Calif.

45. *A. longifolia* Nutt. Perennial, with a suffrutescent base or woody caudex; stem 3-12 dm. high, silvery-tomentose; leaves linear or lance-linear, tomentose on both sides, in age greener above, with revolute margins; heads erect, in a narrow raceme-like panicle; involucre 5-6 mm. broad, tomentose; bracts ovate or oval; flowers about 20, yellow. *A. natronensis* A. Nels., a broad-leaved form. Plains in alkaline soil: Man.—Colo.—Ida.—Wash. *Plain.* Jl—Au.

46. *A. diversifolia* Rydb. White-tomentose perennial, with horizontal rootstock; stem simple, leafy, 5-10 dm. high; leaves densely tomentose on both sides, subsessile, 5-10 cm. long, the lower usually pinnately cleft into 3-5 narrowly lanceolate-acuminate lobes, which are directed forward, the upper or all entire, linear-lanceolate, passing into the bracts of the inflorescence; inflorescence a narrow panicle, 1.5-3 dm. long; heads numerous; involucre 3-4 mm. high and 3 mm. broad; bracts oblong or ovate-oblong, scarious-margined, densely villous-tomentose; flowers light yellow. Valleys: Hudson Bay—Neb.—Colo.—Calif.—B.C. *Plain—Submont.* Jl—S.

47. *A. platyphylla* Rydb. Perennial, with a creeping rootstock; stem 4-6 dm. high, finely tomentose, simple; lower leaves cuneate-obovate, 5-8 cm. long, with rounded-ovate mucronate lobes above the middle, equally tomentose on both sides; middle leaves similar, but the lobes deeper, triangular or lanceolate; upper leaves ovate or lanceolate, with 3 lanceolate lobes or entire; heads many, in a narrow panicle; involucre hemispheric, 4-5 mm. high and nearly as broad; bracts densely floccose, the outer ovate, acute, the inner oval, obtuse; flowers 15-25; corollas yellow. *A. ludoviciana latiloba* Nutt. Banks: Wash.—Ore.—Mont.

48. *A. Brittonii* Rydb. Perennial, with a horizontal rootstock; stem rather stout, 3-6 dm. high, white-floccose; lower leaves thick, cuneate or oblong-ob-lanceolate, 3-5-lobed, mostly above the middle, densely white-tomentose on both sides, the lobes lanceolate; upper leaves ovate-lanceolate, entire; panicles narrow; involucre 3-4 mm. high, about 2 mm. broad; bracts ovate and densely floccose; flowers about 15, light brown or yellow. Hills and plains: Wyo.—Ore.—Ariz.—N.M.; n Mex. *Submont.* Au—O.

49. *A. rhizomata* A. Nels. Perennial, with a caespitose rootstock; stem 4-6 dm. high, white-tomentose; leaves white-tomentose on both sides, 2-4 cm. long, the lower elliptic, oblanceolate, or oblong-cuneate, usually with 3-5 short ovate or lanceolate lobes, the upper lanceolate and entire; heads comparatively few, in a narrow, spike-like panicle; branches of the latter short, with 2-6 erect heads; involucre campanulate, about 3.5 mm. high and 3 mm. broad, densely tomentose; bracts ovate to elliptic, obtuse; ray- and disk-flowers each 7 or 8; corollas light brown. Hills: Wyo.—N.M. *Submont.*

50. *A. albula* Woot. Perennial, with a rootstock; stem tomentose, 4-10 dm. high; lower leaves ovate in outline, 4-5 cm. long, 3-5-lobed, white-tomentose on both sides; upper leaves linear to narrowly oblong-lanceolate, 1-3 cm. long, 2-5 mm. broad, usually entire; heads in an open leafy panicle, very numerous; involucre 3 mm. high, 2 mm. broad, tomentose; flowers 15-20, yellow. *A. microcephala* Woot., not Hildebr. Dry plains: Tex.—Colo.—s Calif.; n Mex. *Son.* Au—O.

51. *A. floccosa* Rydb. Perennial, with a creeping rootstock; stem stout, 5-8 dm. high, tomentose; leaves 3-5 cm. long, pinnately divided into oblong, linear, or lanceolate divisions, loosely white-tomentose on both sides, the upper often entire; heads erect, short-peduncled, in a racemiform panicle; involucre 5-6 mm. broad, hemispheric; bracts oval, tomentose, scarious-margined; flowers 30-60, brownish. *A. gracilentia* A. Nels. *A. paucicephala* A. Nels., is a form with more entire leaves. Dry banks and mountains: Mont.—Wyo.—Ore. *Plain—Mont.* Au—S.

52. *A. candicans* Rydb. Perennial, with a creeping rootstock; stem stout, 5-10 dm. high, tomentose, branched; leaves pinnately or bipinnately divided into oblong divisions, or the upper entire, densely tomentose on both sides; heads numerous, sessile, in small clusters forming interrupted spikes or panicles; invo-

61. *A. Abrotanum* L. A much branched shrub, 5-10 dm. high; lower leaves petioled, 4-6 cm. long, twice pinnately dissected into linear-filiform divisions, with revolute margins, slightly tomentose beneath; heads numerous, nodding in leafy panicles with racemiform branches; involucre hemispheric, about 3 mm. high and 5 mm. broad; bracts canescent, the outer linear-lanceolate, the rest broadly oval, scarious; ray-flowers about 10; disk-flowers 15-20. Around dwellings: N.B.—Mass.—N.C.—Colo.; escaped from cultivation, native of s Eu. and the Orient.

62. *A. Bigelovii* A. Gray. Perennial, with a suffruticose base; stems many, 2-3 dm. high, silvery-canescant; leaves linear-cuneate to oblong, mostly 3-toothed at the apex, about 1 cm. long, silvery-canescant; heads numerous in a thyriform panicle; involucre canescent, about 2 mm. high and 1.5 mm. broad, 2-4-flowered; flowers yellow, one, or rarely two, of them pistillate. *A. petrophila* Woot. & Standl. Rocky banks and cañons: Tex.—Colo.—Utah—Ariz. Son. Au-S.

63. *A. cana* Pursh. Shrub, 3-30 dm. high; branches strict, canescent; leaves linear or lance-linear, acute at both ends, 1-4 cm. long, silvery-canescant on both sides, or the lower with 2-3 acute teeth or lobes at the apex; heads glomerate, in a leafy panicle; involucre 5-9-flowered; outer bracts linear or subulate, the inner oval, all more or less tomentose; flowers yellowish. *A. columbiana* Nutt. Plains and hills: Sask.—Colo.—Utah—Ore.—Mont. Plain—Mont. Au-S.

64. *A. arbuscula* Nutt. Low shrub, 1-3 dm. high; branches slender, canescent; leaves short-cuneate or flabelliform, 3-lobed or 3-parted, 5-12 mm. long, silvery-canescant, or the uppermost entire; heads rather few, in a spike- or raceme-like panicle; involucre about 4 mm. high and 3 mm. broad, 7-9-flowered; bracts elliptic, at least the outer decidedly tomentose; flowers brownish. Dry mountains and high plains: Wyo.—Calif.—Wash. Submont.—Mont. Je-Au.

65. *A. spiciformis* Osterhout. Shrub, 3-10 dm. high; branches somewhat canescent; leaves oblanceolate or cuneate, 1-3 5 cm. long, 3-toothed at the apex or the upper entire, silvery-canescant; heads comparatively few, in a spike- or raceme-like inflorescence; involucre about 6 mm. high and 5 mm. wide, about 12-flowered; bracts imbricate, ovate, at least the outer tomentose; flowers brownish. *A. Rothrockii* A. Gray, in part. Dry plains: Colo.—Utah. Son.—Mont. Au-S.

66. *A. tridentata* Nutt. Shrub, 1-4 m. high, much branched; bark of the old stems shreddy; branches erect, silvery-canescant; leaves cuneate, 1-2 cm. long, 3-toothed (rarely 4-7-toothed) at the apex, or the upper linear-cuneate and entire, silvery-canescant; heads paniculate, numerous; involucre well imbricate, about 4 mm. long and 2 mm. wide, 5-8-flowered; bracts oval-elliptic, at least the outer densely tomentose; flowers yellow or brownish. Dry plains and hills: Neb.—Colo.—Calif.—B.C. Plain—Mont. Jl-O.

67. *A. angusta* Rydb. A shrub, 10-12 dm. high, with erect branches; leaves canescent, 2-4 cm. long, 1-4 mm. wide, linear and entire or linear-cuneate and merely 3-toothed at the apex; heads numerous, clustered in leafy panicles; involucre 3.5-4 mm. high, 2 mm. broad; the outer bracts thick, ovate, less than one-fourth as long as the innermost; inner bracts oblong, obtuse, scarious-margined; flowers 4-6. *A. tridentata angustifolia* A. Gray. Plains: Wash.—Ida.—Nev.—n Calif. Son.

68. *A. nova* A. Nels. Undershrub, 1-3 dm. high; branches slightly tomentose, strict; leaves narrowly cuneate, 0.5-2 cm. long, 3-toothed at the apex, finely silvery-canescant; heads numerous, in a narrow, racemiform panicle; involucre 3-4 mm. high, scarcely 2 mm. broad, 2-4-flowered; bracts well imbricate, glabrate or slightly puberulent, elliptic; flowers light brown. Plains and tablelands: Mont.—N.M.—Ariz.—Ida. Submont.—Mont. Au-O.

69. *A. tripartita* Rydb. Shrub or undershrub, 2-6 dm. high; branches canescent; leaves 3-cleft or 3-parted or the upper entire, silvery-canescant; blades or lobes narrowly linear; heads numerous, in a leafy panicle; involucre about 4 mm. high and 2 mm. broad, 3-6-flowered; bracts well imbricate, the

outer linear or oblong, densely canescent, the inner oval; flowers brownish. *A. trifida* Nutt. Plains: Mont.—Colo.—Nev.—Ore.—Wash. *Plain—Mont.* Au-S.

70. *A. rigida* (Nutt.) A. Gray. Undershrub, 2-4 dm. high; branches rigid, slightly canescent when young, soon glabrate, leafy to the top; leaves rigid, silvery-canescant, linear-filiform, 3-cleft, or the upper and those of the fascicles entire, 1-2 cm. long; heads solitary (rarely 2 or 3), sessile in the axils of the leaves; involucre 3 mm. long, 1.5-2 mm. wide, 5-12-flowered; bracts oval, well imbricate, hyaline-margined; corollas tinged with purple. Rocky ridges: Ore—Ida.—Wash. *Son.* Au-O.

71. *A. pygmaea* A. Gray. Perennial, with a woody, caespitose caudex; branches 1 dm. high or less, slightly canescent or glabrate; leaves 5-10 mm. long, rigid, pinnatifid with 3-7, linear-subulate divisions, thick, glabrous above, slightly canescent beneath; heads few, in a short spike-like inflorescence; involucre 4-5 mm. long, 2-3 mm. broad, 3-4-flowered; bracts imbricate, the outer lanceolate, the inner elliptic. Desert regions: Nev.—Utah. *Son.* Au-S.

124. **PETASITES** L. SWEET COLTSFOOT, BUTTERBUR.

Perennial herbs, with thick creeping rootstocks. Leaves basal, long-petioled, with ample reniform, cordate, triangular, or sagittate blades, usually tomentose beneath, appearing later than the scaly-bracted flowering stems. Heads racemose or corymbose, subdioecious. Involucre campanulate; bracts in one series, herbaceous. Flowers of the fertile plants, all or most of them pistillate, fertile; corolla irregularly 2-5-toothed and cylindric, or else ligulate. Flowers of the substerile plant mostly hermaphrodite, but sterile, and a few pistillate ones at the margin; corolla of the sterile flowers tubular and 5-toothed; style 2-lobed, but ovary sterile. Achenes narrow, 5-10-ribbed. Pappus of soft white bristles.

Leaf-blades sagittate or cordate, pinnately veined (except in *P. vitifolia*)

Leaves not cleft.

Leaves repand-denticulate, with numerous teeth.

Leaves angulately and sinuately few-lobed.

Leaves cleft one-third to one-half to the midrib, lobes dentate

Leaves not broader than long, only one pair of lateral veins rising from the base

Leaves decidedly broader than long, two or more pairs of lateral veins rising from the base

Leaves round-reniform, pedately veined and lobed.

1 *P. sagittata*

2 *P. frigida*.

3 *P. corymbosa*

4 *P. vitifolia*

5 *P. palmata*

1. *P. sagittata* (Pursh) A. Gray. Leaf-blades cordate, ovate-cordate to deltoid-cordate, 1-3 dm. long, 1-2 dm. wide, with a deep basal sinus, glabrate above, white-tomentose beneath; scape 2-3 dm. high; heads corymbose; involucre obconic, 8-9 mm. high, glandular-pubescent as well as tomentose; ligules of the substerile heads 5-7 mm. long, 1-1.5 mm. wide, those of the subfertile heads smaller, 3-5 mm. long, less than 1 mm. wide. *Tussilago sagittata* Pursh. *Petasites dentata* Blankinship. Wet grounds. Lab.—Minn.—Colo.—Alaska *Plain—Mont.* My-Jl.

2. *P. frigida* (L.) Fries. Leaf-blades deltoid or cordate, with an open basal sinus, 2-10 cm. long and as broad, sinuately few-lobed or coarsely dentate; lobes or teeth 11-20; heads racemose-corymbose; involucre about 1 cm. high, tomentulose and glandular-pubescent; bracts oblong, obtuse, purplish; ligules of the substerile heads about 8 mm. long and 1.5-2 mm. wide, those of the subfertile heads about 2 mm. long and 0.5 mm. wide. Wet places: Mack.—B.C.—Alaska; n Eu. *Alp.* Je-Jl.

3. *P. corymbosa* (R. Br.) Rydb. Leaf-blades broadly deltoid or cordate in outline, 3-10 cm. long and broad, deeply cleft, the lobing extending one-third to one-half the distance to the midrib; divisions again lobed or dentate, with triangular lobes or teeth; peduncles 2-3 dm. high; heads corymbose; involucre 8-10 mm. high, glandular-pubescent, scarcely tomentose; ligules of the substerile heads 5-7 mm. long, 1.5 mm. broad, those of the subfertile heads 2 mm. long, 0.5 mm. wide. *Nardosmia corymbosa* R. Br. *P. palmata frigida* Macoun. Wet places: Alta.—B.C.—Alaska. *Subalp.* Je-Au.

4. *P. vitifolia* Greene. Leaf-blades broadly cordate or deltoid-reniform, 5-12 cm. long, 8-20 cm. broad, with two or more lateral veins rising from the base, usually 5-lobed, the basal lobes usually deeply 2-cleft and the terminal one 3-5-lobed; lobes coarsely dentate; scape 2-3 dm. high; involucre over 1 cm. high, glandular and floccose; ligules of the substerile heads about 7 mm. long and 1.5 mm. wide. Wet places: Man.—Alta. *Boreal.* Je-Jl.

5. *P. palmata* (Ait.) A. Gray. Leaf-blades reniform in outline, 5-15 cm. long, 10-30 cm. wide, sparingly villous-tomentulose beneath, pedately veined and lobed; lobes oblanceolate, coarsely few-toothed, with broadly triangular, mucronate teeth; scape stout, 1.5-6 dm. high; heads corymbose; involucre about 1 cm. high, somewhat glandular-pubescent, tomentulose at the base; ligules of the substerile heads about 5 mm. long, 1 mm. wide, those of the fertile heads 2.5-3 mm. long, 0.5 mm. wide. Boggy places: Newf.—N.Y.—Minn.—Alta. *Plavn—Boreal.* Je-Au.

125. *CROCIDIUM* Hook.

Small winter annuals. Leaves alternate. Heads radiate. Involucre hemispheric; bracts 8-12, equal, oblong. Ray-flowers about 12, pistillate, fertile; ligules yellow. Disk-flowers hermaphrodite, fertile; corollas yellow, with slender tube, campanulate throat, and 5-toothed limb. Anthers with deltoid-ovate tips. Style-branches short and broad, with deltoid appendages. Achenes fusiform, obscurely 3-5-ribbed, papillate. Pappus of a single series of white barbellate bristles, or in the ray-flowers wanting.

1. *C. multicaule* Hook. Stems several from the base, 1-2 dm. high, slightly floccose when young; basal leaves tufted, obovate or spatulate, sessile or short-petioled, few-toothed, 2-5 cm. long; stem-leaves linear, entire or the lower denticulate; involucre 7-8 mm. broad, hemispheric; bracts lance-ovate, acute; flowers golden yellow; ligules 5-8 mm. long; achenes ovoid, angled, scurfy. Plains and hills: B.C.—Ida.—Calif. *Son.* Mr-My.

126. *PSATHYRÒTHES* A. Gray. VELVET-ROSETTES.

Low pubescent or scurfy, winter annuals. Leaves petioled, with broad blades. Heads discoid. Involucre hemispheric; bracts in 2 series, at least the outer herbaceous; receptacle flat. Flowers all hermaphrodite and fertile; corolla with a very short tube, cylindric throat and short obtuse teeth, woolly at the summit. Style-branches flat, obtuse or truncate, with obscure appendages. Achenes terete, turbinate-villous or hirsute. Pappus of numerous stiff, ferruginous bristles.

Leaves not beset with long hairs

Outer bracts obovate, larger than the inner, spreading tomentum long-villous

Outer bracts oblong, not longer than the inner, erect, tomentum fine, furfuraceous

Leaves with scattered long-jointed hairs

- 1 *P. ramosissima.*
- 2 *P. annua*
- 3 *P. pilifera.*

1. *P. ramosissima* (Torr.) A. Gray. Stem branched from the base, scurfy-tomentose, branches decumbent, 8-12 cm. high; leaf-blades rounded, subcordate or cuneate at the base, 1-2 cm. broad, scurfy-tomentose, crenate; head solitary, axillary, involucre 5-6 mm. high; flowers yellow; achenes short-turbinate, densely long-villous. Gravelly hills: Ariz.—s Utah—Nev.—s Calif.; L. Calif. *L. Son.* Ap-My.

2. *P. annua* (Nutt.) A. Gray. Stem branched from the base, 5-12 cm. high, scurfy-tomentose; leaf-blades orbicular or rounded-ovate, cuneate at the base, coarsely dentate, 1 cm. broad or less; heads solitary, axillary, short-peduncled; involucre 5-7 mm. high; corollas pale yellow, sometimes changing into purplish; achenes oblong-turbinate, densely villous. Saline plains: Ariz.—s Utah—Nev.—s Calif. *Son.* My-Au.

3. *P. pilifera* A. Gray. Stem branched from the base, scurfy-tomentose, 5-15 cm. high; leaf-blades rhombic-obovate or subrotund, with cuneate base, entire, scurfy-tomentose and hirsute-ciliate on the margins and petioles; heads

short-peduncled; involucre campanulate, about 1 cm. high; outer bracts oblong-linear; achenes cylindric, short-hirsute. Arid places: s Utah. *Son.* Au-S.

127. HAPLOËSTES A. Gray.

Suffrutescent perennials. Leaves opposite, linear-filiform, somewhat fleshy. Heads cymose, radiate. Involucre campanulate; bracts 4 or 5, broadly oval, strongly overlapping. Receptacle flat, naked. Ray-flowers few, pistillate and fertile. Disk-flowers hermaphrodite and fertile. Achenes linear, terete, glabrous, ribbed. Pappus of a single series of rigid, scabrous, white bristles.

1. *H. Greggii* A. Gray. Stem 3-6 dm. high, branched, glabrous, leafy; heads cymose; involucre hemispheric, about 4 mm. high; bracts glabrous, obovate, shorter than the disk; flowers yellow; ligules 3-5, oblong, about 3 mm long. Saline soil: Tex.—Kans.—Colo.—N.M.; n Mex. *Son.* Je-S.

128. ÁRNICA L. ARNICA.

Perennial caulescent herbs, ours with rootstocks. Leaves mostly opposite, entire or toothed. Heads usually radiate, rarely discoid, several or solitary. Involucre campanulate or turbinate; bracts equal, in 1 or 2 series. Receptacle flat, naked, pubescent, or fimbriate. Ray-flowers pistillate and fertile; ligules yellow. Disk-flowers many, hermaphrodite and fertile; corolla tubular, yellow. Anthers sometimes sagittate. Achenes narrow, 5-10-ribbed, pubescent or glabrous. Pappus a single series of capillary, scabrous bristles.

Stem with several pairs of leaves, the upper not conspicuously reduced (except in *A. Parryi*); heads usually several.

Heads nodding in the bud, usually discoid.

I. ERADIATAE

Heads erect in bud, radiate

Basal leaves cordate or ovate, long-petioled

Pappus white, merely barbellate, involucre turbinate (except in *A. granulifera*), not conspicuously glandular-hirsute (except in *A. paniculata*).

Achenes densely hirsute, involucre densely villous at the base

II. CORDIFOLIAE

Achenes glabrous, glandular-puberulent, or with a few scattered hairs above

Involucre, peduncle, and achenes densely glandular-granuliferous

Involucre hemispheric, disk about 15 mm high

III. GRANULIFERA

Involucre turbinate; disk 10-12 mm high

IV. GRACILES

Involucre slightly villous at the base, scarcely glandular, turbinate, disk about 15 mm high

V. LATIFOLIAE

Pappus tawny or brownish, distinctly plumose, involucre distinctly glandular-hirsute

VI. DIVERSIFOLIAE

Basal leaves lanceolate or oblanceolate, short-petioled.

Pappus distinctly plumose, brownish

Achenes glandular-granuliferous, involucre glandular-granuliferous and somewhat hirsute, leaves narrowly linear-lanceolate, entire or nearly so.

VII. LONGIFOLIAE

Achenes pubescent, not glandular, involucre usually glandular-hirsute (villous in *A. gracilentia* and glandular-granuliferous in *A. arcana*)

VIII. MOLLES

Pappus merely barbellate, white or yellowish

Leaves numerous, more or less grayish, the larger more than 7 cm long; pappus yellowish, heads many

IX. FOLIOSAE

Leaves rather few, green, the larger not more than 7 cm long, pappus white; heads 1-3

X. ALPINA

Stem-leaves 1-3 pairs, the upper much reduced, linear or linear-lanceolate, heads 1-3.

Heads erect.

Involucre hemispheric, glandular-hirsute; pappus brown, plumose

XI. PEDUNCULATAE

Involucres turbinate, villous at the base (glandular only in *A. arnoglossa*); pappus white, barbellate.

X. ALPINA

Heads nodding in bud

XII. LESSINGIANAE

I. ERADIATAE.

1. *A. Parryi*

One species.

II. CORDIFOLIAE

Heads numerous, involucre more or less glandular-hirsute, bracts linear.

2. *A. paniculata*.

Heads 1-3, rarely 5; involucre villous, only with sessile glands.

Plant 2-4 dm high, leaves thin, usually coarsely toothed, bracts oblanceolate

Lower leaves with a close sinus, their teeth salient

3. *A. grandifolia*.

Lower leaves with an open sinus, their teeth directed forward.

4. *A. cordifolia*.

- Plant 1-2 dm. (rarely 3 dm.) high, leaves thick, subentire, or with a few teeth; bracts linear-lanceolate
5. *A. pumila*
- III GRANULIFERAE.
One species 6. *A. granulifera*.
- IV GRACILES
Upper leaves not linear
Bracts linear-lanceolate, leaves thin, usually more or less dentate. 7. *A. gracilis*
Bracts oblanceolate; leaves thick, usually entire 8. *A. puberula*
Upper stem-leaves linear, much reduced 9. *A. arnoglossa*.
- V LATIFOLIAE.
Leaves decidedly hairy, especially above. 10. *A. Jonesii*
Leaves nearly glabrous
Achenes slightly glandular-granuliferous, and with a few scattered hairs above.
Leaves not saliently toothed, merely denticulate 11. *A. ventorum*
Leaves saliently and coarsely toothed 12. *A. Menziesii*
Achenes glabrous, leaves more or less toothed. 13. *A. latifolia*.
- VI DIVERSIFOLIAE
Leaves thin, nearly glabrous 14. *A. silvatica*
Leaves thick, densely glandular-puberulent, at least above. 15. *A. diversifolia*.
- VII LONGIFOLIAE
Involucre merely puberulent or glandular-granuliferous, leaves not caudate-attenuate; stem usually over 3 dm high 16. *A. longifolia*
Involucre copiously hirsute, as well as puberulent, leaves caudate-acuminate 17. *A. caudata*.
- VIII MOLLES
Involucre villous, not at all glandular or viscid 18. *A. macilentia*
Involucre more or less glandular or viscid
Involucre densely glandular-granuliferous, only with a few white hairs 19. *A. arcana*
Involucre decidedly villous or hirsute, as well as glandular.
Middle stem-leaves broadly ovate, less than 5 cm long; stem 2-3 dm high
Involucre less than 1 cm high, villous at the base, only slightly glandular;
bracts broadly lanceolate 20. *A. coloradensis*
Involucre 12-15 mm. high, densely glandular-hirsute, bracts narrowly ob-
lanceolate 21. *A. ovata*
Middle stem-leaves lanceolate, oblanceolate, or linear-lanceolate 22. *A. mollis*
Bracts oblanceolate, abruptly acuminate
Bracts linear or lanceolate
Stem-leaves more or less sharply dentate, except at the base.
Leaves nearly glabrous, except the margins
Stem-leaves ovate-lanceolate, broad at the base 23. *A. amplexifolia*
Stem-leaves oblanceolate or narrowly lanceolate, narrowed at the base 24. *A. Macounii*
Leaves decidedly pubescent, both villous and glandular-granuliferous. 25. *A. regularis*
Stem-leaves entire, sparingly denticulate, densely glandular-puberulent 26. *A. subptumosa*.
- IX. FOLIOSAE.
Pubescence of the leaves long and soft, villous.
Bracts obovate-oblanceolate, mostly obtuse. 27. *A. tomentulosa*
Bracts oblong-lanceolate, acute
Plant sparingly pubescent, with long flat hairs, leaves long-acute 28. *A. Chamissonis*
Plant densely pubescent with fine hairs; leaves acute or obtuse
Leaves broadly oblanceolate or lanceolate 29. *A. rhizomata*
Leaves linear or lance-linear. 30. *A. foliosa*
Pubescence of the leaves very short and fine
Stem-leaves linear-lanceolate, usually entire or callous-denticulate, involucre rarely more than 1 cm high.
Pubescence of the involucre and peduncle very short and fine 31. *A. ocreata*
Pubescence of the involucre and peduncle longer and coarser. 32. *A. celsa*
Stem-leaves broadly lanceolate, more or less dentate, involucre usually more than 1 cm. high. 33. *A. rubricaulis*.
- X ALPINAЕ.
Stem-leaves ovate 34. *A. Rydbergii*
Stem-leaves linear to lanceolate 35. *A. tenuis*
Leaves glabrate in age, at least above.
Involucre and peduncle more or less glandular-puberulent; achenes hispidulous. 9. *A. arnoglossa*
Involucre more or less villous, at least at the base; achenes canescent
Leaves and lower part of the stem glabrous or nearly so; leaves mostly acute; bracts green.
Leaves strongly 3-ribbed.
Leaves faintly 3-ribbed.

Leaves and stem villous when young; leaves mostly acuminate; bracts purple-tinged
 Leaves densely villous-tomentose.

36. *A. alpina*37. *A. tomentosa*

XI PEDUNCULATAE.

Stem with tufts of brown wool at the base.

38. *A. pedunculata*.

Stem without tufts of wool at the base

39. *A. fulgens*

XII LESSINGIANAE.

One species.

40. *A. Louiseana*

1. *A. Parryi* A. Gray. Stem 2-6 dm. high, somewhat hirsute-villous below, glandular above; lower leaves petioled; blades ovate or ovate-oblong, usually denticulate; upper leaves sessile, narrowly lanceolate, smaller and entire; heads 3-9; involucre broadly turbinate, 12-15 mm. high, glandular-hirsute; bracts linear, attenuate; ligules usually none, but the marginal flowers sometimes ampliate; achenes hirsute or glabrate; pappus brownish, subplumose. *A. eradiata* (A. Gray) Heller. Mountains: Alta.—N.M.—Utah—Ore.—B.C. Mont.—Alp. Jl.—Au.

2. *A. paniculata* A. Nels. Stem 4-7 dm. high, glandular and viscid-villous; blades of the basal leaves broadly ovate, subcordate at the base, 6-10 cm. long, viscid-villous on both sides; stem-leaves 3-4 pairs, the lower petioled, the upper sessile; blades ovate, denticulate; heads paniculate-cymose; involucre nearly hemispheric, 12-15 mm. high; bracts linear-lanceolate, acute or acuminate; achenes hirsutulous. Moist woods: Mont.—Wyo.—Utah. Au.

3. *A. grandifolia* Greene. Stem 3-4 dm. high, sparingly villous-ciliate or glabrous; basal leaf-blades ovate-cordate, 5-7 cm. long, toothed; stem-leaves about 3 pairs, the lowest pair long-petioled; blades cordate, with a narrow sinus, 10-15 cm. long, saliently toothed with triangular teeth, puberulent above, glabrous or nearly so beneath; upper stem-leaves subsessile, oval or ovate; involucre nearly hemispheric, about 15 mm. high; bracts oblanceolate, short-acuminate. Perhaps a large-leaved form of *A. cordifolia*. Mountain sides: Mont.—B.C. Mont. Jl.

4. *A. cordifolia* Hook. Stem 2-6 dm. high, somewhat viscid; basal leaf-blades broadly cordate, usually coarsely toothed, 3-10 cm. long, puberulent, and viscid-villous on the veins; stem-leaves 2-4 pairs, all except the uppermost petioled and cordate or rarely ovate; involucre campanulate-turbinate, 15-18 mm. high; bracts oblanceolate, acuminate. *A. abortiva* Greene, a small-leaved form. Wooded hills: Alta.—Colo.—Calif.—B.C. Submont.—Subalp. Je—Au.

5. *A. pumila* Rydb. Stem 1-2, rarely 3 dm. high, viscid-villous; basal leaf-blades firm, ovate, rarely subcordate, entire or few-toothed, 2-5 cm. long, puberulent; stem-leaves 1-3 pairs, short-petioled or the upper sessile; involucre turbinate, 10-12 mm. high, puberulent and slightly villous. *A. parvifolia* Greene. *A. Evermanni* Greene. Mountains: Alta.—Colo.—Utah—B.C. Mont.—Subalp. Je—Au.

6. *A. granulifera* Rydb. Stem about 3 dm. high, glandular-granuliferous; basal leaves petioled, with probably cordate blades, fallen at the time of flowering; lower stem-leaves obovate, dentate, about 5 cm. long, glandular-granuliferous, thin, with strong ribs; upper stem-leaves ovate or cordate, sessile; heads 3-5; involucre about 12 mm. high and 2 cm. broad; bracts oblanceolate, abruptly acuminate, glandular-granuliferous and slightly ciliate; ligules orange, about 1 cm. broad; achenes glandular-puberulent, striate; pappus dirty white, barbellate. Mountains: Mont. Mont. Au.

7. *A. gracilis* Rydb. Stem slender, 1-3 dm. high, glabrous; inflorescence glandular-pruinose; basal leaf-blades broadly ovate, dentate, 3-ribbed, 2-4 cm. long, glabrous or nearly so; stem-leaves 2 or 3 pairs, the lower short-petioled, the upper sessile and smaller; heads usually 1-5; involucre turbinate, about 1 cm. high; bracts oblanceolate, acuminate; achenes sparingly glandular-pruinose. *A. lactucina* Greene. *A. columbiana* A. Nels. *A. multiflora* Greene, with more numerous heads. (?) *A. ovalifolia* Greene. Mountain meadows: Alta.—Wyo.—Wash.—B.C. Submont.—Mont. Je—Au.

8. *A. puberula* Rydb. Stem about 3 dm. high, glandular-puberulent; lower leaves short-petioled; blades ovate, 2-4 cm. long, puberulent and glandular-pruinose, entire or slightly dentate; upper stem-leaves sessile, ovate, mostly entire; heads 1-5; involucre turbinate, about 1 cm. high and broad; bracts oblanceolate, glandular-puberulent, with deltoid tips; ligules 10-12 mm. long; achenes glandular-puberulent, brown; pappus straw-colored, barbellate. Rocky places and hillsides: Alta.—Wyo.—B.C. *Mont.* Jl—Au.

9. *A. arnoglossa* Greene. Stem 3-5 dm. high, rather slender, glandular-puberulent and with scattered hairs; lower leaf-blades lanceolate, acute, wing-petioled, remotely serrate, strongly 5-ribbed, firm, sparsely scabrous, pale beneath; upper stem-leaves lanceolate, sessile; heads 1-5, usually 3; involucre turbinate, 9-10 mm. high, glandular-puberulent; achenes slightly hirsute. Hills: (Black Hills) S.D.—Wyo.—Alta. *Submont.*—*Mont.* Je—Au.

10. *A. Jonesii* Rydb. Stems 3-4 dm. high, glandular-puberulent and slightly villous, especially on the peduncles; basal leaves long-petioled; blades ovate-cordate, 1-3 cm. long, sparingly villous and glandular-puberulent; stem-leaves sessile, ovate-cordate, 2-5 cm. long, dentate; heads 1-3; involucre turbinate, 10-12 mm. high and as broad; bracts linear-lanceolate, acuminate, slightly villous, as well as glandular-puberulent; ligules about 1 cm. long; achenes glandular-puberulent and with a few stiff hairs on the upper part; pappus straw-colored, barbellate. Mountains: Utah. *Mont.* Jl—Au.

11. *A. ventorum* Greene. Stem 2-4 dm. high, glabrous or nearly so; basal leaf-blades ovate to orbicular-cordate, thin, repand-denticulate, 3-6 cm. long, delicately ciliate, otherwise glabrous; stem-leaves 2-3 pairs, the lower short-petioled, the upper sessile, oval or ovate, acute, minutely denticulate; heads 1-3; involucre turbinate, 12-15 mm. high, puberulent; bracts narrowly oblanceolate, acuminate; achenes glandular-scabrellous. Wet places in the mountains: Wyo.—Utah. *Mont.* Au.

12. *A. Menziesii* Hook. Stem 3-6 dm. high, sparingly hairy or nearly glabrous below; basal leaf-blades cordate or broadly ovate, sinuately dentate, 4-8 cm. long, minutely puberulent, thin; stem-leaves 2-4 pairs, the lower short-petioled, the rest sessile and usually more sharply toothed; heads 3-5; involucre broadly turbinate, 10-12 mm. high; bracts narrowly oblanceolate, acuminate; rays bright yellow, 12-15 mm. long; achenes sparingly glandular-puberulent, or with a few short hairs towards the apex. *A. platyphylla* A. Nels., at least in part, more glabrous than the type. Meadows: Calif.—Mont.—Alaska. *Mont.* Je—Au.

13. *A. latifolia* Bong. Basal leaf-blades 4-6 cm. long, ovate or cordate, toothed, minutely puberulent or glabrate, thin, lower stem-leaves short-petioled and more oval, upper stem-leaves sessile, oval; heads 1-5; involucre turbinate, 12-15 mm. high, sparingly villous-pilose; bracts narrowly oblanceolate, acuminate; achenes usually wholly glabrous. *A. teucrifolia* Greene. *A. platyphylla* Rydb. (Fl. Colo.). *A. ventorum* Coult. & Nels., in part, not Greene. Wet places: Alta—Colo.—Utah—Alaska. Je—Au.

14. *A. silvatica* Greene. Stem slightly villous, with scattered hairs and somewhat glandular-puberulent above; basal leaf-blades ovate, glabrous or slightly glandular-puberulent above, hirsutulous-ciliate on the margins, coarsely dentate; stem-leaves 4-5 pairs, the lower wing-petioled, the uppermost sessile, very coarsely incisely dentate, all more or less connate-sheathing; heads 3-5; involucre hemispheric, 12-15 mm. high; bracts linear-lanceolate, acute; achenes sparsely hirsute. Woods: Colo. *Mont.* Jl—Au.

15. *A. diversifolia* Greene. Stem 3-6 dm. high, densely glandular-puberulent and with a few scattered hairs; basal leaf-blades broadly ovate or subcordate, saliently toothed, glandular-puberulent on both sides or nearly glabrate beneath; upper stem-leaves ovate and sessile, saliently toothed; heads 1-5; involucre hemispheric; bracts lanceolate, acuminate; achenes hirsute on the angles. *A. latifolia viscidula* A. Gray. Mountains: Alta.—Calif.—B.C. *Mont.* Jl—S.

16. *A. longifolia* D. C. Eat. Stem tufted, leafy, 3-6 dm. high, finely puberulent; leaves linear-lanceolate, 5-15 cm. long, entire or denticulate, finely puberu-

lent, sessile, the lower sheathing at the base; heads paniculate-cymose; involucre hemispheric, 8-10 mm. high, densely puberulent; bracts linear, attenuate. *A. polycephala* A. Nels. Meadows: Mont.—Colo.—Calif.—Wash. *Submont.*—*Mont.* Jl—Au.

17. *A. caudata* Rydb. Stem 2-3 dm. high, leafy, villous, and densely glandular-puberulent; leaves linear-lanceolate, mostly sheathing at the base, densely glandular-puberulent and with scattered villous hairs, 5-10 cm. long, with entire, somewhat revolute margins; heads mostly 3, cymose; involucre turbinate, about 1 cm. high; bracts linear-lanceolate, almost subulate, attenuate; ligules nearly 1 cm. long. Wet places: Utah. *Mont.* Au.

18. *A. macilentia* Greene. Stem 4-7 dm. high, softly villous; leaves 5-6 pairs, the lower ones elliptic-ob lanceolate, tapering below into winged petioles, often connate-sheathing, sparingly and softly short-pubescent on both sides, repand-denticulate or entire; upper leaves lanceolate, sessile; heads 1-3; involucre hemispheric, about 12 mm. high; achenes sparingly hirsutulous; pappus tawny, barbellate. Mountains: Colo.—Utah—Wyo.—(? Alta.). *Mont.*—*Subalp.* Jl—Au.

19. *A. arcana* A. Nels. Stem about 3 dm. high, glandular-granuliferous; basal leaves petioled; blades oblong-ob lanceolate, glandular-granuliferous, denticulate; upper leaves lanceolate, sessile, 3-5 cm. long; heads usually 3; involucre turbinate, about 8 mm. high; rays orange; achenes sparingly hispidulous; pappus whitish, barbellate. Rock crevices in the mountains: Wyo.—Utah—Ida. *Mont.* Jl—Au.

20. *A. coloradensis* Rydb. Stem about 2 dm. high and with about 3 pairs of leaves, villous; lower leaves obovate, nearly sessile, sparingly pubescent, 4-5 cm. long; upper leaves sessile, ovate or ovate-lanceolate, 5-nerved; heads often solitary or few; involucre hemispheric; bracts broadly oblanceolate, acute or acuminate, often tinged with purple, 8-9 mm. long; ligules bright yellow, over 1 cm. long; achenes finely strigose. Mountains: Colo. *Mont.*

21. *A. ovata* Greene. Stem 3-4 dm. high, glandular-puberulent and slightly villous; lower leaves obovate, with short winged petioles, finely pubescent on both sides, callous-denticulate or entire; upper stem-leaves ovate, sessile; heads 1-5; involucre hemispheric, 10-15 mm. high; bracts lanceolate, acuminate; achenes hirsute, angled. Mountains: Utah—Wyo. *Mont.*—*Subalp.* Jl

22. *A. mollis* Hook. Stem 3-6 dm. high, glandular-puberulent and more or less villous; lower leaves oblanceolate, short-petioled, 5-15 cm. long, usually denticulate, more or less pubescent on both sides; upper leaves sessile, ovate to lanceolate; heads 1-3, involucre hemispheric, 12-15 mm. high; achenes hirsute. *A. crocea* and *A. crocina* Greene. Mountains: Alta.—Colo.—Utah—Wash—B.C. *Submont.*—*Mont.* Je—Au.

23. *A. amplexifolia* Rydb. Stem 3-6 dm. high, sparingly ciliate; stem-leaves ovate-lanceolate, sharply and salicently dentate, 5-12 cm. long, broad, rounded and sometimes half-clasping at the base; heads 3-9; involucre hemispheric, about 12 mm. high; bracts linear-lanceolate, acute or acuminate; achenes hirsutulous. *A. amplexicaulis* Nutt. (?) *A. columbiana* Greene. *A. Greenei* A. Nels. Mountains in damp places: B.C.—w Mont.—Wash. *Submont.* Je—Jl.

24. *A. Macounii* Greene. Stem 6-10 dm. high, glabrous or sparingly ciliate; lower stem-leaves oblanceolate, tapering below, 5-15 cm. long, salicently dentate, hispidulous-ciliate on the margins, sparingly pubescent above; upper stem-leaves elongate-lanceolate, long-attenuate, somewhat clasping; heads 1-7; involucre hemispheric, 10-12 mm. high; bracts linear-lanceolate, acuminate; achenes hirsutulous. Valleys: B.C.—Alta.—Mont.—Wash. *Submont.*

25. *A. rivularis* Greene. Stem 3-6 dm. high, more or less glandular-granuliferous and sparingly hirsute; leaves 3-5 pairs, the lowest short-petioled and oblanceolate, the rest sessile, lanceolate, denticulate; heads 3-5; involucre hemispheric, about 12 mm. high; bracts linear-lanceolate, acuminate; ligules 10-12, deep yellow, 12-15 mm. long; achenes sparingly hirsutulous and granuliferous. Along mountain streams: Alta.—Ore.—B.C. Je—Au.

26. *A. subplumosa* Greene. Stem 3-8 dm. high, more or less villous and somewhat glandular above; lower leaves oblanceolate, wing-petioled, 5-10 cm. long, denticulate or entire; upper stem-leaves sessile, lanceolate or oblanceolate; heads 1-5; involucre hemispheric, 10-15 mm. high; bracts linear-lanceolate, acute; achenes hirsute, rarely almost glabrous. *A. Chamissonis longinodosa* A. Nels. *A. subplumosa sylvatica* A. Nels., in part, a low form. Mountain meadows: Mont.—Colo.—Utah. *Mont.—Subalp.* Je—Au.

27. *A. tomentulosa* Rydb. Stem villous, about 4 dm. high; leaves oblanceolate, obtuse, sessile or the lower with short-winged petioles, denticulate, finely villous-pubescent, almost tomentulose, with two pairs of stronger veins, the larger 13 cm. long, somewhat yellowish; heads few, hemispherical; involucre about 12 mm. high and 2 cm. broad; bracts ovate or ovate-oblong, villous; rays light yellow, over 1 cm. long; achenes sparingly hispidulous. (?) *A. stricta* A. Nels. Mountains: Wyo.—Colo. *Mont.* Au.

28. *A. Chamissonis* Lessing. Stem 4-6 dm. high, softly villous, very leafy; lower leaf-blades oblanceolate, tapering into winged petioles, which are connate-clasping, usually with 5 stronger veins, 7-15 cm. long, denticulate or entire; upper leaves lanceolate, sessile; heads cymose-pauculate; involucre hemispheric, about 1 cm. high, hirsute-villous; bracts narrowly linear-lanceolate; achenes hirsutulous. Wet places: Sask.—Mont.—Ida.—B.C. *Submont.* Jl—Au.

29. *A. rhizomata* A. Nels. Stem 2-5 dm. high, densely short-tomentose; leaves 5-7 pairs, oblong-lanceolate, obtuse or acute, 6-9 cm. long, denticulate or entire, densely tomentose, the lower tapering into winged petioles, which are sheathing at the base, the upper sessile; heads 1-5; involucre 10-12 mm. high, more or less villous-tomentose; bracts oblong or oblong-lanceolate, obtuse or acute; achenes sparingly hirsutulous. *A. lanulosa* Greene. *A. exigua* A. Nels., a depauperate form. Valleys: Mont.—Colo.—Utah—Ida. *Mont.—Subalp.* Jl—Au.

30. *A. foliosa* Nutt. Stem 3-6 dm. high, tomentose, slightly glandular-puberulent in the inflorescence; leaves linear or linear-lanceolate, densely tomentulose, entire or rarely denticulate, 5-10 cm. long, the lower petioled, the upper sessile; heads 1-7; involucre about 8 mm. high, hemispheric, tomentose, at least at the base; bracts linear or lance-linear, acute; achenes hispidulous. Wet places: Mack.—Colo.—Utah—Alaska. *Submont.—Mont.* Jl—Au.

31. *A. ocreata* A. Nels. Stem 2-4 dm. high, sparingly puberulent, somewhat glandular so above; leaves linear-lanceolate, entire, or sparingly denticulate, finely puberulent, but green, the lower tapering into petioles, more or less sheathing, the upper sessile; heads 3-5; involucre somewhat turbinate, 7-9 mm. high, finely puberulent; achenes glabrous or sparingly hispidulous. Valleys: Mont.—Wyo.—Utah. *Plain—Submont.* Jl—Au.

32. *A. celsa* A. Nels. Stem 4-6 dm. high, sparingly villous, and glandular-puberulent in the inflorescence; leaves 6-8 pairs, puberulent and glandular-granuliferous, green, linear-oblanceolate or linear-oblong, the lower petioled, with sheathing bases; upper leaves sessile, lanceolate; heads 3-5, corymbose-cymose; involucre hemispheric, nearly 1 cm. high, villous as well as glandular-puberulent; bracts linear-lanceolate, acute; achenes sparingly hirsutulous. Perhaps not distinct from the preceding. Wet meadows: Mont.—Colo.—Ida. *Submont—Mont.* Jl—Au.

33. *A. rubricaulis* Greene. Stem 3-6 dm. high, villous, often tinged with reddish purple; leaves lanceolate, 8-15 cm. long, the lower tapering into winged petioles, all thin, triple-ribbed, sinuate-dentate or -denticulate, short-pubescent on both sides; heads many, paniculate; involucre about 1 cm. high, nearly 2 cm. broad; bracts lanceolate, acutish, sparsely hirsute; ligules about 12 mm. long; achenes hirsute; pappus brownish, plumose. Meadows: B.C.—Mont.—(?) Alaska). *Submont.—Mont.* Je—Au.

34. *A. Rydbergii* Greene. Stem 2-4 dm. high, sparingly villous; basal leaves oblanceolate, entire, petioled; stem-leaves 3-4 pairs, glabrate or sparingly